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# Trust Building in Supply Chains

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### Abstract

Holistic supply chain collaboration has appeared to be difficult to implement in strategic alliances due to managers' lack of understanding the dynamics of trust-building. Too much reliance on technology and too little understanding of the nature of collaborative trust have led to a situation where strategic alliances often fail to thrive. This lack of awareness can be additionally observed in the supply chain literature: the concept of trust is covered without a profound scientific accuracy or clarity. In fact, views on trust are conflicting heavily even within the supply chain discipline. *"Trust may be the most overused and abused word in the alliance lexicon."* (Fawcett et al. 2012).

This thesis aims to fix this gap of knowledge; it establishes a holistic model of trust-building and studies the phenomenon from the perspective of several different disciplines such as cognitive science, sociology, microeconomics and psychology to build a profound background for the topic. The aim is to merge the supply chain use of the concept 'trust' with the mainstream of its meaning in other disciplines such as in cognitive science.

The factors resulting in trust are additionally studied with an empirical questionnaire (n=220) for Finnish logistics experts. The results suggest that trust building in supply chains is explained by the knowledge-based theory of trust rather than the calculus-based theory. Neither asset specific investments nor contracting seem to have a high explanatory power for explaining trust in supply chain context. However, the time spent in a particular supply chain collaboration, the efficient use of tacit knowledge, extensive information sharing, partner's reputation and the efficiency & seamlessness of the collaboration explain the existence of trust in supply chain collaboration. The calculus-based view on trust with its emphasis on transaction cost economics (TCE) is, therefore, an outdated view on supply chain management.

Additionally, trust can be seen as a capital built on the norm of reciprocity and cooperative interaction. Trust is more easily lost than formed since the reciprocity norm punishes heavily those who exploit their trustors. Trust capital is created in a temporal context and accumulated through an iterative process, which takes time and requires the parties to learn about each other, in other words, to gather knowledge. A higher amount of trust capital allows people to trade and negotiate better terms in the context of commerce and trade.

These results imply that trust-building in supply chains should be supported by corporate level policies, which encourage the creation of interpersonal relationships and collective learning between organizations. This requires trust. The findings suggest that the formation and use of highly complex tacit knowledge in supply chains allow the companies to form sustainable competitive advantages. Forming affinity groups provides an efficient way to make supply chains flourish through the accumulation of tacit knowledge and thus to increase the innovation capabilities and competitive advantages of the supply chain alliances.

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**Keywords** trust, supply chain management, transaction cost economics, knowledge management, trust capital, tacit knowledge, affinity groups, collaboration, strategic alliances

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# 1 Introduction

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*“Trust is the glue of life. It’s the most essential ingredient in effective communication. It’s the foundational principle that holds all relationships.” – Stephen R. Covey (1995)*

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The practice of Supply Chain Management (SCM) has become a more and more pivotal discipline in business literature since the mid and late-90’s. Supply chain relationships are nowadays a field of extensive study (Sahay 2003) due to companies’ growing focus on specialization to their core competencies. This development has led to a situation where noncore operations and functions have been sold and outsourced (Gereffi et al. 2005). Technological development together with deregulation of trade have made global sourcing a reality (Christopher et al. 2006). This progress and increasing competition have led companies to realize the importance of building and maintaining long-term (strategic) relationships with their partners (Ganesan 1994; Mentzer et al. 2001; Prajogo & Olhager 2012).

However, according to Christopher and Lee (2001) businesses focus often too much on the tangible and traditional parts of Supply Chain Management at the expense of the important intangible elements. Barrat (2004) argues that supply chain collaboration seems to be difficult to implement due to too much reliance on technology and the lack of understanding what human collaboration is fundamentally about. Obsession with technology is often the largest barrier to collaboration (Ireland and Bruce 2000). According to Fawcett et al. (2012) *“Managers understand neither the nature of trust nor the dynamics of trust building.”*

As McGrath and Sparks (2005) argues, the study of inter-organizational relationships has tended to exclude social factors for several decades, as the focus has been mostly on the economic foundations of transaction costs. They argue that a new, more modern and extended view on SCM should be established, which includes social factors such as *“trust, interdependence, and a long-term perspective.”* The actual nature of human collaboration should be understood better for supply chains to gain their full potential.

The key fundamental, which this thesis focuses on is the concept of trust. Studies on trust have been neglected or ignored in the supply chain management context due to the complexity of this phenomenon (Christopher and Lee 2001; Barrat 2004). Moreover, the

companies have failed to implement and understand the collaborative capabilities and nature of trust building in supply chain alliances (Fawcett et al. 2012). The lack of trust is the greatest single stumbling block why strategic alliances between companies tend to fail (Sherman 1992). Without a foundation of trust, collaborative approach to business (as in supply chain management) cannot happen (Daugherty et al. 2006; Fawcett et al. 2012).

Ballou (2006) argues that the elements of collaboration and trust need to be at the core of supply chain management discipline in the future: “*Logistics curricula transforming to a supply chain curricula should be expanded to include the subjects of **relationship and trust building**.*” The lack of this creates a research gap in the supply chain literature. Since trust and relationship building are such vital parts of supply chain collaboration, they should be covered properly in this context.

In addition to neglecting the importance of the concept of ‘trust’ in supply chain literature, there are also several conflicting views on trust even within the supply chain literature context. On the one hand, there is the *calculus-based view*, which relies on the traditional transaction-cost economics (e.g. Suh & Kwon 2006; Williamson 2008). On the other hand, a great variety of supply chain literature recognizes a more holistic, interdisciplinary and multidimensional view on trust as a temporal *knowledge-based* phenomenon (e.g. McAllister 1995; McGrath & Sparks 2005; Ballou 2006; Fawcett et al. 2012; Müller 2014). The conflict between these views create an interesting research gap: which one of them have more explanatory power to describe the essence of trust in supply chain management?

The key motivation for conducting this study is the fact that supply chain management is essentially very much about human psychology and collaboration. Therefore, the lack of profound research and the conflicting views in existing literature creates demand for studying trust in the context of supply chain management, more closely. A greater comprehension of this matter will essentially lead to a better understanding of the dynamics of supply chain integration and thus to managerial implications for increasing business performance.

## 1.1 The research questions and the aim of the study

The research problem and gap of this thesis are that the important dynamics of trust-building is not known well enough in the supply chain context, and the existing views are inadequate and even partly conflicting. **The objective of this study is to give some normative implications and recommendations for improving supply chain efficiency with paying**



**attention to trust-building dynamics.** Therefore, the results of this study are not only meant to be descriptive but also normative and having managerial implications for companies in supply chains. For these reasons, the research questions of this thesis are:

**1) What is trust, and what is its relationship with Supply Chain Management?**

- a) This question is relevant as there is a significant amount of definitions, ambiguity, and confusion about ‘what is trust’ between different disciplines of scientific literature. Sometimes the definitions and uses vary even inside the specific disciplines such as Supply Chain Management (McKnight & Chervany 2001; Barrat 2004; Castelfranchi & Falcone 2010; Nickel & Vaesen 2012).
- b) *“Trust may be the most overused and abused word in the alliance lexicon.”* (Fawcett et al. 2012). The study of Fawcett et al. was the only profound article that the author could find from this specific perspective. There is thus a lot to discover about this topic.
- c) There is clearly need to be careful with using the term ‘trust’ as there are plenty of different definitions and confusion in the scientific community about it. This thesis tries to create common ground with cognitive sciences, evolutionary biology, and other disciplines to get a good grasp of the fundamental meaning of the term.
- d) As there is a clear and sound definition of ‘trust,’ the concept can be applied and studied in the supply chain context with a greater scientific accuracy.
- e) As the literature cited in Introduction section suggests, there should be built a new set of supply chain frameworks, on the emphasis on collaboration and trust. The role of trust in SCM should be studied based on existing literature and then expanded through new findings.

**2) Can trust be seen as a capital?**

- a) Harisalo & Miettinen (2010) argue that ‘trust capital’ is the “first order” form of capital in the world. Also, some theories in sociology and cognitive science see (Ostrom 1988; Mui et. al 2002) trust as an asset-like byproduct of reciprocity. Can, therefore, trust be interpreted as a capital in a similar way that Putnam views the concept ‘Social capital’?

**3) How is trust accumulated in supply chain collaboration?**

- a) If it is confirmed that trust is a form of capital or asset, it should be studied how trust is accumulated and what factors encourage trust-building and what factors discourage it.
- b) How can the special traits of supply chain collaboration be taken into account with trust frameworks?

**4) Is the nature of trust in supply chain context more calculative or knowledge-based?**

- a) As the introduction section suggests, there are two main viewpoints concerning trust in supply chain context; the calculative-based (Suh & Kwon 2006; Williamson 2008) and the knowledge-based (McAllister 1995; McGrath & Sparks 2005; Ballou 2006; Müller 2014) theories. Which one of these is more accurate perspective and explains the phenomenon better?

**5) How can trust building be encouraged to increase the performance of supply chains?**

- a) As several citations in the introductory section, (followed by the literature review in Section 2) suggests, trust-building can enhance supply chain performance and therefore it should perhaps be encouraged in organizations.
- b) If so, what are the best means to do so? What are some of the concrete ways to promote trust-building in supply chains?
- c) It is assumed that a good framework on trust-building should be established to understand trust dynamics in supply chains. Therefore, we need to answer questions 1, 2, 3 and 4 to get the best knowledge to respond the fifth question.

Existing literature assesses mainly some aspects of these issues separately and in a narrow sense but fails to build a thorough framework. The research gap should be filled as supply chain management practice is often dominated by technological aspects at the expense of human perspective as described in the introduction.

The results of this thesis aim to provide an insight into the mechanisms of trust-building. This thesis will hopefully contribute to the supply chain literature by aligning the disciplines view of trust better with the established ‘trust literature’ of other disciplines instead of applying the concept in a tendentious way of its own. The goal is that this framework will be a useful theoretical tool in Supply Chain Management (SCM). Better theoretical understanding of trust dynamics in supply chains will contribute to better managerial applications: enhancing the trust building in supply chains and thus growing the overall performance of the organizations.

## **1.2 Research design**

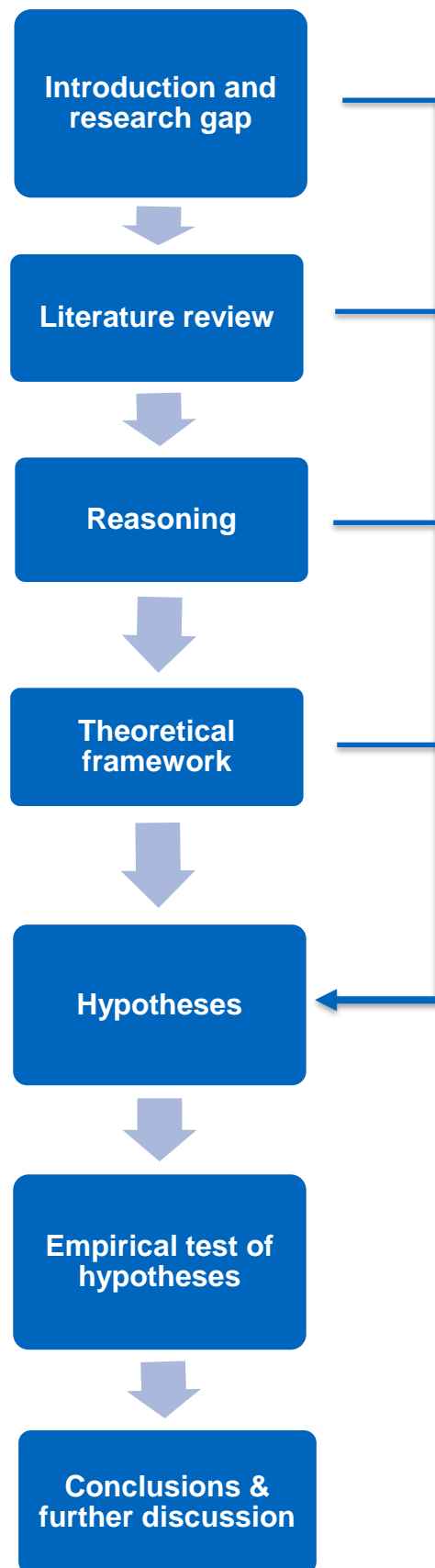
The purpose of this thesis is to build an interdisciplinary and holistic framework of trust building in supply chain context. The literature review is supporting the theoretical part of this thesis. Based on the introduction, literature review, and theoretical reasoning, relevant

hypotheses are formed that will be tested through an empirical questionnaire to study whether the theoretical assumptions receive empirical support or not (Figure 1).

This study begins with the definition of its central concept, ‘trust.’ Secondly, the nature of trust is studied interdisciplinary based on existing scientific literature in the context of several different disciplines such as sociology, cognitive science, microeconomics and evolutionary biology. Thirdly, a thorough literature review of the concept of trust in supply chain context is conducted.

A literature review is then followed by a theoretical framework of trust building and how it enhances the integration of supply chains. The purpose of the framework is to be a sound and holistic description of trust building in supply chains based on the literature review and logical reasoning. The framework will follow the fact that trust is a complex phenomenon that cannot be categorized into only one single scientific domain.

Based on this theoretical model, introduction and the literature review conducted in section 2, relevant hypotheses are formed and finally tested empirically with a survey for Finnish logistics experts (section 4). Based on this data, a statistical analysis is conducted to test whether the hypotheses are supported or not. At last, conclusions of the results of this study are summarized. Finally, the thesis will discuss the aspects of trust building in supply chains, which should be explored further.



*Figure 1: The structure of this thesis.*

### 1.3 Research methodology

The methods used in this research consists of game theory, statistical analysis of variables, linear regression, path regression analysis, survey statistics and some simple microeconomics. The empirical part of this study applies only quantitative methodologies.

The theoretical framework (Framework A, Section 3) consist of applied game-theoretical experiments (inspired by Harisalo & Miettinen 2010). A scenario of repeated prisoner's dilemma (similar to Mor & Rosenschein 1995) in temporal context is used to assess the effect of time preference on trusting behavior (similar to Ellison 1994). The utility stream of the players is calculated based on the individual's time preference and strategies used in collaboration situations where trust is required. This setting is studied to describe the trust building mechanisms, affecting factors and incentives to trust.

The method used in the empirical part (section 4) is a questionnaire, where the collected data will be statistically analyzed. The respondent data in the questionnaire (both A & B sections) is collected from two databases: one from Asiakastieto Plc and The Finnish logistics expert's association (Logy ry.).

The section A of the questionnaire adapts Likert scale survey statistics (Allen and Seaman 2007) to 9 different supply chain related propositions. The hypotheses are supported or rejected based on whether they are agreed more than disagreed by the respondents with the confidence level of over 95%. The margin of error for surveys are calculated through the following formula for a confidence level of 95% (VirtuaaliAMK-verkosto):

$$\pm 1.96 * \sqrt{\frac{p * (1 - p)}{n}}$$

The variable ' $p$ ' refers to the observed amount of answers i.e. '*sample probability*' and ' $n$ ' to the amount of total responses given ( $n=220$ ). Therefore, we can estimate with a 95% confidence level the right percentage of the population that agrees with the propositions. Additionally, we can estimate whether the majority of the population supports the proposition, and are the hypotheses supported or not.

Section B focused on representing 16 propositions of *a specific supply chain companionship with a certain firm* which the respondent is asked to recall to his mind. In this way, it is meaningful to study which aspects of supply chain collaboration explain the existence

or emergence of trust the most. It answers thus to the research question 3 by explaining which factors accumulate trust the most.

The answers of section B were also collected with a 7-option Likert-scale, with the exception of question one, which is about the level of trust in a supply chain. In this question, a 9-option scale was used as it is able to capture more detailed nuances of the answer compared to 7-option scale (Suh & Kwon 2006), as the priority of this thesis is to study especially trust. Suh and Kwon (2006) uses a similar model. The data is analyzed by a multivariate regression analysis (OLS) with Stata software to get parameter coefficients, -values, r-squared values, and so forth.

A path regression analysis is used to explain the dynamics of trust-building more closely (Suh & Kwon 2005). The statistical analysis will hopefully reveal which aspects of collaboration have the strongest and most statistically significant effect on trust and trust building in supply chains. The results give us a hint what factors should be taken into account to increase the level of trust in supply chains. It also helps to answer the research question 4, to see whether calculative-based factors explain more trust than knowledge-based factors or the other way around. The quantitative model is built on Likert-scale respondent data, which is then used to explain the emergence of trust similarly to Suh & Kwon's studies (2005 & 2006).

## 1.4 Initial Hypotheses

To support the initial claims mentioned in this introduction section by empiric evidence, the initial hypotheses of this study are the following:

**Hypothesis 1 (H1):** "Trust and the seamlessness of human collaboration are more important factors for the success in supply chains than the use of technology."

**Hypothesis 2 (H2):** "The role of technology as a superior factor of supply chains is often exaggerated."

## 2 Literature review

As the concept of trust is highly complex and rich (Jarrat & Ceric 2015), it is meaningful to conduct a thorough literature review to define the it and the phenomena related to it. As it is made clear enough what all these concepts are and how they are interrelated, building a theoretical framework upon them is more meaningful. This is also relevant since studies show that managers in companies understand neither the trust-building process nor the nature of trust (Fawcett et al. 2012).

This section starts with defining the concept of **trust** and reviewing a meta-analysis conducted by Castaldo (2002) of related literature. Then it builds the understanding of the dynamics of the concept and how it is related to supply chain management and finally relevant hypotheses are formed based on the literature review and logical reasoning.

As the phenomenon is wide-ranging and broad, it is meaningful to get a grasp of it through different disciplines such as microeconomics, sociology, and other social sciences as well as evolutionary biology. As trust is understood poorly in supply chain context (Fawcett et al. 2012), I will provide a thorough backgrounding to the phenomenon in general with the literature review, and later add up how all of this is related to supply chains and supply chain management. The following literature review section thus deals with the first research question: *“What is trust, and what is its relationship with Supply Chain Management?”*

The concept of ‘trust’ is used in various ways in different contexts. This often creates confusion and misunderstandings in the scientific literature (McKnight & Chervany 2001; Castelfranchi & Falcone 2010; Nickel & Vaesen 2012). This is why the trust related discussion should be backed with an interdisciplinary foundation. After this, trust in supply chain context is covered in section 2.3.

### 2.1 The concept of ‘trust’

When we look at the history of scientific literature and published articles, we see there is a great variety of different definitions for the concept of trust. Trust is a social construct that is the glue of human interaction and society (Covey 1995; Harisalo & Miettinen 2010). This section, 2.1, studies the phenomenon broadly from sociological, evolutionary biological and cognitive science perspectives.

According to Castaldo (2002, as cited in Castelfranchi & Falcone 2010), the amount of definitions for trust has increased exponentially during recent decades. More than this, there is a significant amount of confusion and ambiguity surrounding the concept of trust (Castelfranchi & Falcone 2010). A common problem with these trust definitions is that trust is often rather defined based on the needs of the context where it is used, than paying attention to the scientific accuracy of the concept. As an example, trust means different thing to an economist compared to the perception of a sociologist, marketer, philosopher or an information scientist (McKnight & Chervany 2001). In fact, the definition of trust varies even within these fields (Nickel & Vaesen 2012).

According to a thorough meta-analysis of trust definitions, conducted by Castaldo (2002), there are five categories, which constantly occur in the definitions of trust: *construct*, *trustee*, *actions & behaviors*, *results & outputs* and *the risk element*. Based on this thorough meta-analysis, these five seem to be the central elements of trust.

The *construct* or *conceptual type* refers to the element that what is trust essentially conceived to be. Common ways to define trust concerning of conceptual types is to consider trust as an expectation, disposition, belief or an attitude (McKnight & Chervany 2001) of a cognitive agent.

The *trustee* category refers to the individual, firm, organization or a family which the trust link is or is not established. Depending on the nature of the counterpart of a trust associated act, there are different types of trust: personal, inter-organizational and institutional. The trustee is usually evaluated based on certain attributes and traits such as values, competencies, reputation and tendency for opportunism and so on. The question “*which characteristic is most important*” depends on context (McKnight et al. 2001). The trustee does not have to be necessarily a cognitive agent: the trustee may also be an object (trust in the safety of a car) or an institution (trust in the monetary system).

*Actions and behaviors* underline the nature of trust in the way that trust must be manifested through the actions and behaviors of human beings. Without the act of trusting, the ‘intentions’ or ‘attitudes’ of trusting are empty words. The actual behavior fulfills the positive intentions (attitude) of trusting (Ståhle & Blomqvist 2000). Both parties (trustor and trustee) and their actions should be taken into account when relationship relying on trust is studied further.



*Results and outputs* refer to the notion that a trust relationship is formed on the assumption that the results of cooperation are positive and relatively predictable for both parties engaged. People develop dispositions to trust other people in general when they grow up (Erikson 1968). Conscious actors collaborate in trust relying ways in order to achieve goals which benefit them.

Acts of trust involve (by definition) always some form of *risk*, which has to be accepted (Mayer & Davis 1995). Without free will and autonomy of trustor and trustee, the study of risk would be pointless as everything would be deterministic. Thus the concept of trust would not be needed even to define. A central aspect of trusting behavior is trustor's *vulnerability* to the trustee: the trustor makes himself vulnerable for trusting and is exposed for example to the risk of deception or opportunistic behavior. Trustor gives the trustee power over himself as the dependency is formed (McKnight & Chervany 2001). Thus the attitude, and more importantly the behavior, of trusting is always about managing risk. Therefore, the trustor must gather information about agents whether or not they can be trusted.

### 2.1.1 The basics of trust

Cognitive scientists Castelfranchi and Falcone (2010) represents two different meanings for trust, which are interconnected as they demonstrate. These are trust as a) *a psychological attitude* and b) *as a decision to act relying on, counting on or depending on* the trustee (See Figure 2). (Blomqvist (2002) presents a similar concept model.) They argue that a profound definition and theoretical framework has to include both components. The dyadic relationship of these two meanings jointly forms the concept of trust.

Trust as an act relying on the trustee (b) includes implicitly the notion that the cognitive agent X has conducted an analysis of the trustee in the specific context, i.e. has formed an attitude of trusting the trustee Y (a). On the other hand, the attitude of trusting (a) is the presupposition to the act of trusting (b).

The process which leads to trusting acts includes a positive evaluation of the trustee. Trusting action with positive outcomes, in turn, improves the mental attitude to trust (Castelfranchi & Falcone 2010). The causal relationship between (a) and (b) is, therefore, a two-way relationship. In temporal context, they form a loop of trusting behavior (Figure 2).

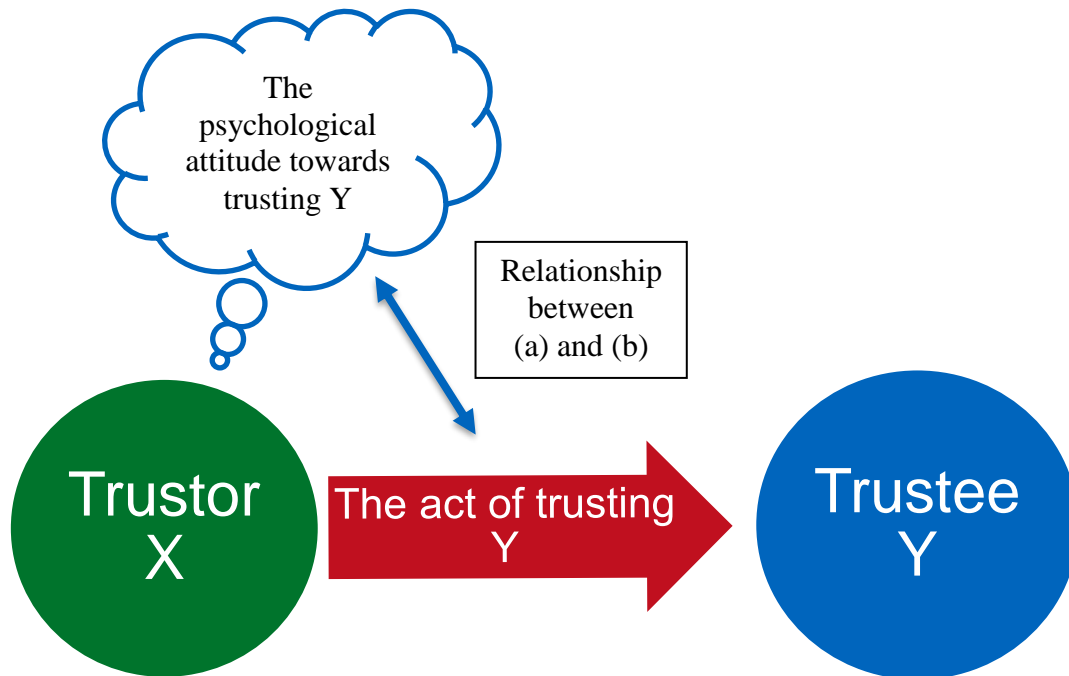


Figure 2: The relationship between the two natures of trust (Castelfranchi & Falcone 2010).

### 2.1.2 Theoretical definition of trust

As we continue to explore trust from the cognitive science perspective, we will expand the model further with an accurate definition of trust. Castelfranchi and Falcone represent in their book *Trust Theory* (2010) a profound theoretical definition or a model of trust which includes all the fundamentals of trust mentioned by Castaldo (See section 2.1). They view trust as a *relational construct* in social reality between two agents: the trustor X and the trustee Y.

For the model to be meaningful, the trustor X must be an intentional cognitive agent as the act and attitude of trusting is a social construct existing only in the social reality. Otherwise, the definition of trust as a mental attitude would not be met since only a cognitive agent can have mental perceptions. The trustor has to have goals and vision of causal acts in order to reach his goals (von Mises 1949). The trustee Y is an agent, but in a broader sense than X. Y could be for example an institution or a group of people, even a chair (Blomqvist & Ståhle 2004). The role of trustee Y is in this model the (supposed) ability to cause an outcome, which serves the goals of agent X.

The act  $\alpha$  is the procedure which Y performs to get the outcome,  $p$ . The couple of  $\alpha$  and  $p$  can be combined as Y's task:  $\tau$ . As the outcome  $p$  is desirable in the point of view X for

helping him to reach his goal  $\text{Goal}_x(g)=gx$ ; the act of trusting serves X for increasing his or her utility (wellbeing).

The act of trusting always happens in a context, say C. This variable omits the situational factors such as environment, the context of the act of trusting and other case-specific factors other than the ones mentioned in this section. For example, a well-appreciated cook can have a high reputation and is thus trusted, among his colleagues in a fancy restaurant. However, the same person might have a bad reputation in the context of family life, for example, considered untrustworthy among the family relatives. The context affects the possibility of Y to success in performing  $\tau$ .

Taken these elements, Castelfranchi and Falcone (2010) represents their model as follows:

$$TRUST(X Y C \tau gx)$$

“X trusts Y in context C for performing action  $\alpha$  to realize result  $p$ , which helps X to reach his goal  $gx$ .” The components and their relations should be studied further.

First of all, X trusting Y means the trustor must believe that Y is willing to conduct  $\alpha$ . X will also evaluate if Y is able to perform the act of  $\alpha$ . For Y to be reliable from the perspective of X; he or she must make an evaluation of Y. Is Y able and willing to perform  $\alpha$ ? X needs to analyze whether Y has the needed traits and properties for conducting  $\alpha$ .

This evaluation can be performed by X, both by using his personal experience as well as based Y’s reputation on historically performed acts. The concept of reputation and competence deals with these issues. X must also consider the fact whether Y is dangerous for X in this context as the trustor is by definition vulnerable to the trustee. Predictability is the virtue; which X requires from Y for feeling safe.

Trusting behavior always includes the element of risk. In fact, the concept of trust emerges from the fact that the world is uncontrollable and there is always uncertainty and riskiness (Luhmann 1979). The agent Y could deceit, disappoint or betray X. Since trust makes X vulnerable to Y who has free will or autonomy, he or she can always act opportunistically towards X to benefit himself. X should also consider the side-effects of the outcome  $p$  as there might be side outcomes besides the goal  $gx$ , which is the original motivation of trusting behavior. P could have negative externalities to X himself, other agents around or the society in general.

### 2.1.3 Different types of trust

Given that the phenomenon of trust between two actors, X and Y, has been defined rather accurately with the language of cognitive science in previous sections, we need now to develop the theme further in help with other disciplines. In this and the following sections, 2.1.4 and 2.1.5, the different types, uses, mechanisms and properties of trust are studied more carefully based on the scientific literature (psychology, evolutionary biology & sociology), so that we have finally genuine amount of background research completed to bring the concept of trust to the supply chain management context in section 2.3.

According to Paul and McDaniel (2004), trust can be divided broadly into four specific categories. These are *calculative trust*, *trust in integrity*, *competence trust* and *trust in predictability*. These four and additionally the concepts of *knowledge-based* and *identification-based trust* (Lewicki & Bunker 1995) reflects the phenomenon of trust more or less as we observe it in our everyday life.

*Competence* refers to trusting the trustee's ability to perform the required task  $\tau$ , which the trustor X needs in order to achieve his goals. Trust has therefore in addition to its moral (or goodwill) element a clear dimension associated with the abilities and competencies of the trustee. This perspective is often neglected in trust literature (Castelfranchi & Falcone 2010). Trust can, therefore, refer to the agent Y's competence to get desirable outcomes for the trustors. Competence in this context refers to skills, know-how and technical capabilities of the parties (Blomqvist & Ståhle 2000).

*Calculative trust* refers to the economic calculation of the (boundedly) rational actor who constantly seeks to maximize his or her well-being by assessing costs and benefits. This type of trust is typical in relationships where interpersonal relationships are not formed, but rather the interaction of human beings are about making business for a short while (Paul and McDaniel 2004).

*Predictability* refers to the belief of the trustor that the "expected value of the cooperation" is positive. The process of calculation is associated with this type of trust but is far more institutional by nature. "Predictability-trust" is based on stability, consistency and predictable patterns of past of behavior from the point of view of the trustor.

*Integrity* refers to the assumption that the other party is fair and is relying on the common rules of the society and the established institutions. Honesty and benevolence are

related to this category. This type of trust is flourished from experience and interpersonal partnerships (Ghosh & Fedorowicz 2008).

#### 2.1.4 From calculative trust to knowledge-, and identification-based trust

To develop the theme a bit further, an interesting perspective in the scientific literature, the concept of *knowledge-based* or *cognitive trust*, shall be reviewed. This idea refers to the theoretical foundations that trust building is based on acquiring knowledge in temporal context and about *understanding* the other individual collaborated with (Jarrat & Ceric 2012). Creating knowledge in repeated interactions is the basis of knowledge-based trust. As calculus-based knowledge is founded on the trustor's ability to control, the knowledge-based view's foundation is information (Lewicki and Bunker 1995). (This section lays some theoretical background for the research question 4.)

In personal relationships, knowledge-based trust emerges from the foundations of calculus-based trust after the interactions are repeated by time. The parties form "*knowledge of the other's dependability and reliability*" (McAllister 2006 et. al). The information formed by time serves as the basis of predictability, which in turn increases trust (or distrust), further (Beheshtifar and Naghian 2013).

Knowledge-based trust is more forgiving and "robust" – it enables forgiveness in certain situations if the explanation for violation is understandable (Kopp et al. 2003). Therefore, knowledge-based trust is based more on understanding and empathy than calculus-based trust, which assesses cost and benefits and relies on control.

When knowledge-based trust develops to a certain point, it might transform and give foundation to identification-based trust (Lewicki and Bunker 1995). This transformation happens when people understand each other's well enough, and the relationship is interpersonal. This type of trust requires to "*fully internalize and harmonize with each other's desires and intentions*" (Diamond Management Consulting).

The key is to adapt and share the same preferences with the other, i.e. identify and commit to other's mindset of needs, fears, and behaviors, and think about other's goals partially as one's own goals. Lewicki and Bunker argue that calculative-based trust will emerge in some relationships, knowledge-based trust in many and identification-based trust only in a few (McAllister 2006). This process is seen to develop through time.

The notion that theory of knowledge-based trust is based on trust accumulating by time suggests that trust building is a *process* where it is formed in temporal context through collaboration. This aspect should be analyzed further.

There is some debate in the scientific (supply chain) literature (Suh & Kwon 2005 & 2006) whether knowledge-based theory explains better the phenomenon of trust building in supply chains than the calculus-based theory or not. As this paper is about trust building in supply chains, this question should be answered. This dilemma will be analyzed more in section 2.5.

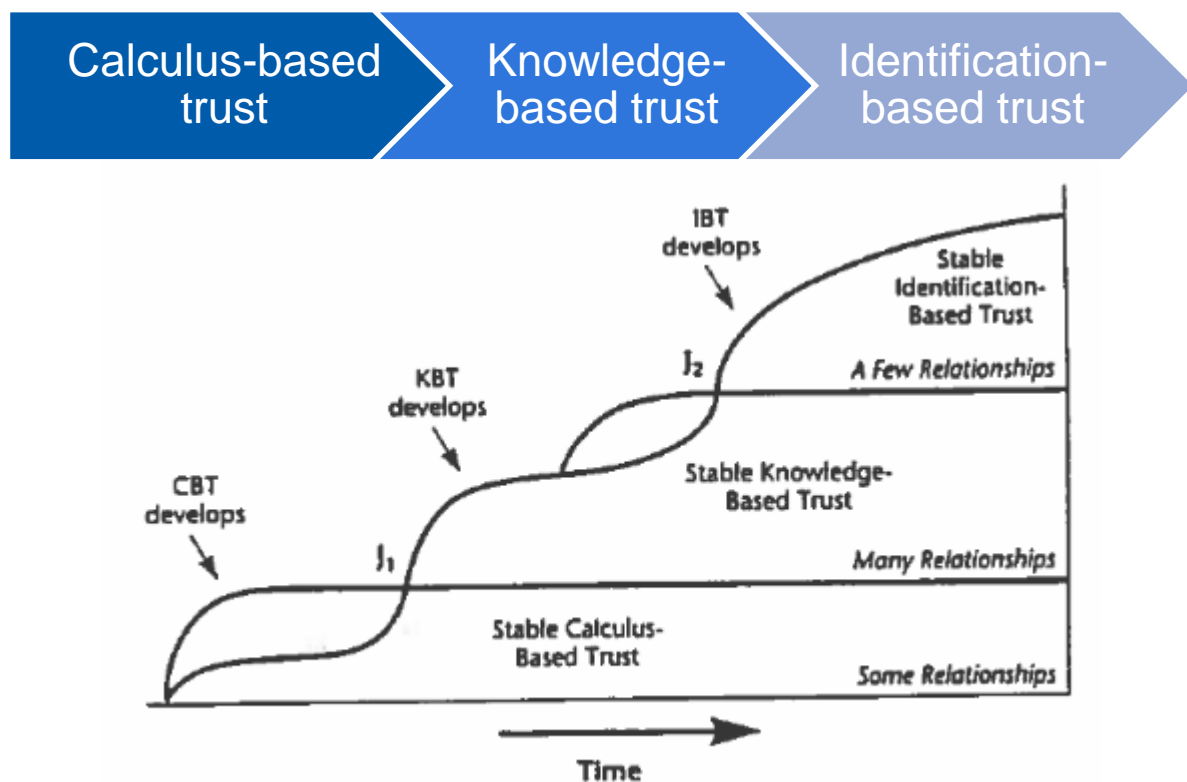


Figure 3: Development of trust according to Lewicki and Bunker (1995).

### 2.1.5 Trust as a process

The previous section suggests that forming trust is a process. This section reviews how the reality looks like. Is trust a process? If so, how trust is accumulated and formed by time and what are the mechanics of trust-building? (See Research question 3.)

According to Castelfranchi & Falcone (2010), forming trust is more than only forecasting probabilities for trusting behavior in a calculative manner. More accurately, forming trust between agent's X and Y is a process (Illes & Platts 2006; Khodyakov 2007). It

requires mutuality and reciprocity. Trust is evolving in a temporal context by repeated interactions which (supposedly) satisfies the both parties.

Trust can be seen to accumulate in an evolving process where the past and current experiences are combined by the trustor to make predictions about the future behavior of the trustee (Blomqvist 2002). Reputation and shared values between individuals enhance the building of trust (Gulati 1995) as the act of trusting becomes more predictable for the trustor. Trust is a two-way interrelationship and learning to trust is usually slow (Harisalo & Miettinen 2010).

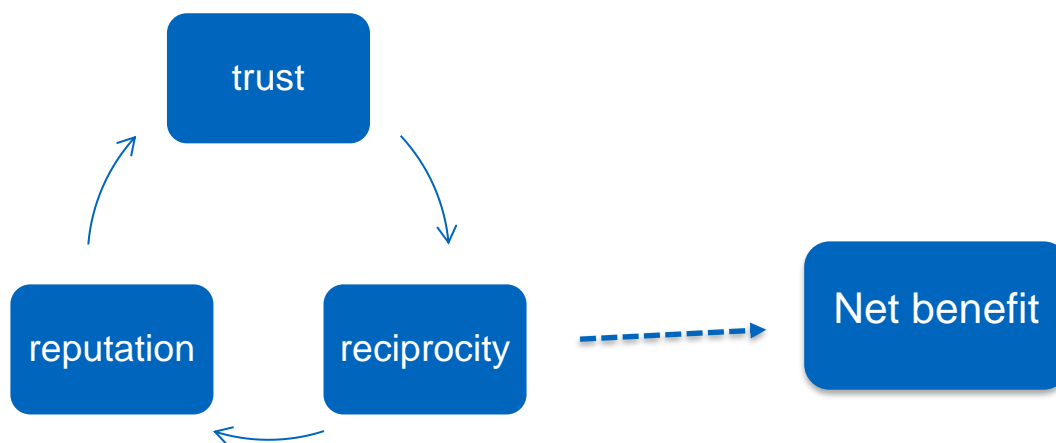
Trust creation process can be best described as a situation where parties involved share ideas, knowledge, feelings and sentiments, which leads to the building of shared social understanding. The creation of connections based on reciprocity, sympathy, and common interest can be seen as prerequisite of a fruitful collaboration (Harisalo & Miettinen 2010). Trust builds up gradually and slowly, but can be lost in once if one of the parties feel that the other one acts opportunistically (Harisalo & Miettinen 2010). The implications of this are that trust is fragile and requires (social) institutions and high level of morality to be preserved.

Noteboom (2002) sees trust as a three-phase process. The first stage is *control*, as trust does not exist between the parties: the agent X must take into account the possible scenarios that the trustee Y is opportunistic or not competent enough to perform the task. Control replaces trust. The second stage is about taking steps towards trust. The trustworthiness of the trustee is assessed through his actions. The trustor discovers on what conditions the collaboration is working and has always the possibility to reverse the relationship back to the control stage. The third stage is about building common frames for trusting between parties. This stage requires the development of shared meanings, concepts, and experience from past. This model of Noteboom is similar to Lewicki and Bunker's model (1995) of calculus-based knowledge developing first to knowledge-based trust and finally into identification based-trust.

According to Granovetter (1992) *"human beings do not start fresh every day, but carry the baggage of previous interactions into each new one."* This implies that being reliable in everyday relationships increases one's reputation and trustworthiness in future. People start the next day where the last day ended regarding accumulated trust and reputation. This indicates that one's history of being trustworthy (or not) influences the opportunities of the individual in the present and future.

The model of Mui, Mohtashemi, and Halberstadt (2002) (Figure 4) implies that trust process is based on the concept of **reciprocity**. They argue that rather than being rational economic agents - game theoretical utility-maximizers, human beings form heuristics of decision making, often based on reciprocity. Bounded rationality makes it wise to employ “routines” such as heuristics so that the limited capacity of the human mind is saved for more unfamiliar situations (Herbert Simon 1983). *Reciprocity norm* emerges in human collaboration when agents confront repeated interactions. According to Ostrom (1998), reciprocity norm is an umbrella term for all social strategies where cognitive agent responds positive actions by positive responses and vice versa with negative actions.

Figure 4: Relationship between trust, reputation and reciprocity (Mui et al. 2002).



According to Mui et al. (2002) the norm of reciprocity, the institution of reputation and the concept of trust creates a triadic relationship with causal links, which leads to benefits for the parties involved (See figure 4). In a social environment where individuals act together constantly, an incentive to act reciprocally emerges because *having a good reputation* increases the agent’s *fitness* in the environment, where reciprocity norm is expected, in terms of evolutionary biology (Nowak and Sigmund 1998).

Trust is built on consistent and predictable acts over a longer period (So & Sculli 2002). An agent with better reputation is considered to be more trustworthy i.e. is trusted more. If the agent “fulfills” his or her reputation and continues to act reciprocally, this again increases the agent’s reputation, and so the loop continues as reputation is built step-by-step. Trust creates trust (Casterfranchi & Falcone 2001).



Trust is built incrementally and gradually. It is strengthened through trusting behavior in the past and with the help of previous positive experiences of trusting (Zand 1972; McAllister 1995). Therefore, the trait of having good reputation and *being trustworthy can be considered as an asset in social environments*.

Blomqvist and Ståhle (2000) defines trust as “*actor’s expectation of the other party’s competence, goodwill and behavior.*” Their model contains “*three layers of trust.*” They believe that all these traits are needed for trust to develop (see Figure 5).

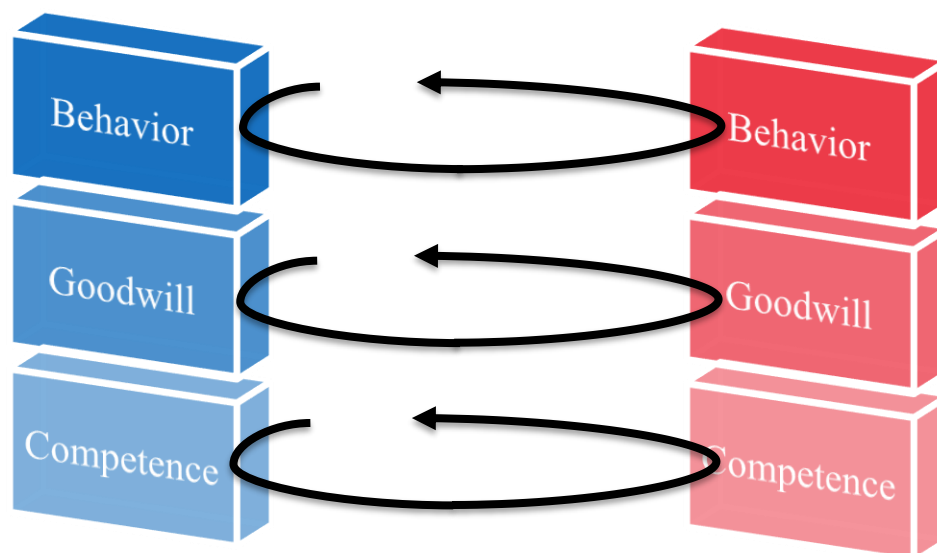


Figure 5: Development of trust through layers of trustworthiness (Blomqvist & Ståhle 2000).

*Competence* is required for people to be able to cooperate in a professional business context. People acting together must have capabilities, skills, and know-how to perform the given tasks. *Goodwill* refers to the moral aspect of trusting, i.e. wishing positive outcomes for the other party. The benevolence of the trustee is of particular importance because the trustor has to accept vulnerability.

Finally, trust must be fulfilled through *behavior*. Actual acts of trust and kept promises confirm whether the trust is misplaced or reciprocal. Trust building should not be “*all talk, no action.*” Trust develops in a process when these three layers of trustworthiness are accumulated. The trustworthiness is reached iteratively when trustor and trustee interacts together (Figure 6). The process will reveal the trustworthiness of the trustee, which in turn will influence the trustor’s propensity to trust him. This creates a circular motion; similar to Castelfranchi & Falcone’s as well as Mui et al.’s models (Blomqvist 2002).

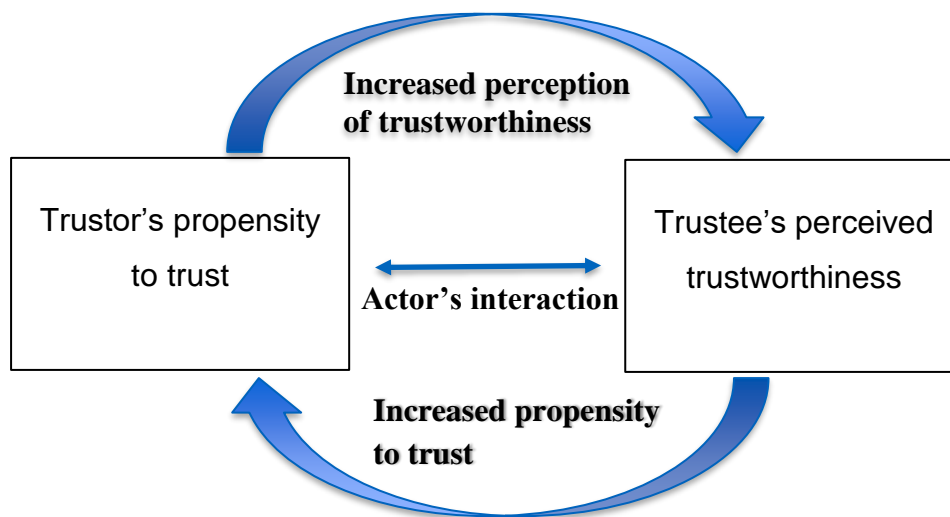


Figure 6: Interaction Dynamics of Trustor and Trustee (Blomqvist 2002).

## 2.2 Trust as a capital

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*“Broadly defined, institutions are the prescriptions that humans use to organize all forms of repetitive and structured interactions including those within families, neighborhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales.” – Elinor Ostrom (2005)*

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This section of the thesis studies ‘trust’ through a sociological perspective and takes a broader view of trust-building in the context of social institutions, society, and gives answers whether trust and social institutions are fundamentally based on rationalistic or evolutionary approach (Hayek 1988). As trust can be viewed as an asset in social environments, it might be interpreted as *a form of capital*. This section studies the benefits of creating and using trust and social capital. This section, 2.2, is linked to the research questions 3, reviewing whether trust can be seen as a form of capital or not.

Harisalo and Miettinen (2010), argues that trust is the “*first order rule of every society*”. Therefore, trust is “*the capital of capitals*”, profoundly creating the meaning for other types of capital, such as the traditional financial capital. Apart from other forms of capital, trust cannot be bought as it can be only *earned* through right behavior. This indicates that the nature

of trust is profoundly based on the virtues of acting moral, cognitive agents. Trust capital motivates people to learn and try new things as it is natural to share and create new ideas in an atmosphere of trust (Harisalo & Miettinen 2010).

According to Luhmann (1979 as cited in Harisalo & Miettinen 2010), *trust capital* helps people to deal with complexity and uncertainty in social contexts. Therefore, these contexts create a demand for trust capital. Trust capital decreases transaction costs as in the atmosphere of confidence people can take new initiatives and start new projects without the fear of being deceived or questioned by default (Harisalo & Miettinen 2010). Trust helps to focus on the essential value creation rather than the aspect of protecting oneself from frauds and being vulnerable.

Trust capital and reputation increase the chance of agent X to establish links to other agents as well as other agents to select the actor with high trust capital as their collaborator. *“Social capital improves the price that trustee can obtain in markets,”* as the trust capital increases his or her market value as a collaborator. This capital helps agent X to earn reputational premium prices in the markets due to the higher amount of trust capital in the eyes of trustors. **Trust is an asset.** A great amount of trust and social capital explains why *“friends and family trade more and on different terms than do the estranged and strangers”* (McGrath & Sparks 2005). The context of family explains well the benefits of a high amount of social capital – transactions are more fluent and secure.

Castelfranchi and Falcone (2010) makes an important remark analyzing trust capital: there are individual and collective forms of trust capital, which should be clearly disentangled. These types of capital are even contradicting each other: individuals benefit if they can stand out in a crowd and thus enjoy a higher concentration of trust capital than the other individuals around them.

Trust capital is highly related to Robert Putnam’s theory of social capital (Harisalo & Miettinen 2010), which for example Coleman (1988) interprets to be consisting of trust, norms of mutuality and networks. According to Hayek (1988) social institution and social capital is accumulated by a spontaneous process, where institutions emerge based on their ability to serve the population which follows the institution. This evolutionary process goes mostly beyond human understanding and is about following the practices, which benefit the population in long-term, not about what “makes sense” and is rational. The process of accumulated social

capital is not “deductive” or “rational” by its nature but practical and acquired by experience and cultural evolution of generations (Laakso 2014).

Based on this chapter of the literature review, the hypothesis formed is the following:

**Hypothesis 3 (H3):** “*Trust can be seen as capital, i.e. ‘trust capital’.*”

### 2.2.1 Trust and rationalism

The debate whether calculation and rationalism are the basis of trust should be reviewed as it deals with the issue that whether trust is explained by the calculus-based or the knowledge-based theory (Research problem 4). Therefore, it is crucial to study the core nature of rationality as the basis of trust and show the problems related to it.

According to the American economist, Robert Sugden (1989), social institutions are formed unconsciously and spontaneously from human interaction. The historical institutions are not formed based on some collective rational designing or calculation, but rather from cumulative cultural evolution. Any amount of rationality cannot replace the role of the spontaneous cultural evolution of institutions. Sugden defends the concept of spontaneous order as the foundation of cultural innovations and criticizes the rational game-theoretical explanations of these institutions (Laakso 2014).

According to Harisalo and Miettinen (2010), the claim that rationality is the prerequisite for trust is highly controversial. They argue that the complexities of everyday life interaction often lead to situations where the *rational behavior* endangers trust. Examples of this include the adverse selection phenomenon in economics.

Agents often have incentives to cheat each other. The rational behavior can as well encourage to spread rumors about other colleagues in an organization to increase one’s relative status in the organization. The point is that rationality and trust may conflict and thus it is highly questionable to regard rationality as the basis of trust (Harisalo & Miettinen 2010).

The Nobel-prize winner economist F. A. Hayek criticizes in his book *The Fatal Conceit* (1988) the concept he refers to as “constructive rationality.” This concept implies that rational deduction and reasoning can explain essentially anything. He refers to this kind of rationalism as “Cartesian rationalism,” named after the rationalist philosopher Rene Descartes. According to Hayek (1988), social institutions are for the most part beyond rational thought and based on

evolutionary rationalism, which is based on practical knowledge and social institutions which are complex.

The relevance of this, on studying the concept of trust, is that trust cannot be reached or acquired by rational thought or calculation as it is epistemologically impossible. The social reality is too complex for a totally rationalistic calculation. There are always some asymmetries in information and the other agent, trustee, is beyond control to some degree, as people are usually autonomous to act according to their free will. Instead of calculation, people use heuristics (Mui et al. 2002) and intuition to evaluate the trustworthiness of the trustee.

The game theory explains as well why rational behavior can lead to non-pareto optimal outcomes (Haugen 2004; Harisalo & Miettinen 2010). One application of this is a game-theoretical setting called “the prisoner’s dilemma”. Two criminals, ‘a’ and ‘b’, are suspected of a crime (Harisalo & Miettinen 2010). If they co-operate, each of them manages to get only a three-year sentence. If one deceives the another; he or she will get free and the other one will get a 10-year sentence. If they both choose to deceives, they both get a 9-year sentence (Table 1).

*Table 1: An application of the Prisoner’s dilemma. Nash equilibrium bolded.*

<b>Prisoner’s Dilemma</b>	Co-operate (b)	Deceive (b)
Co-operate (a)	-3 ; -3	-10; 0
Deceive (a)	0; -10	<b>-9; -9</b>

The game theoretical Nash equilibrium, in this case, is that the both parties are encouraged to deceive, as their economic or selfish utility is maximized in this way, no matter what the other party decides to select. This means that acting rationally both sides fail to reach the best “common good” scenario, i.e. mutually beneficial co-operation. Thus we can say rationality is not fruitful approach for the sake of common good in this scenario. The evidence of this experiment denies that rationality can be the main driver of trust (Harisalo & Miettinen 2010). There has to be an institution preserved which keeps the parties from exploiting each other for their personal good as selfish strategy is not beneficial for the society as a whole.

Based on this game-theoretical framework, trust can be seen as the main reason for why individuals do not necessarily pursue reaching to the selfish *Nash equilibrium* in prisoner’s

dilemma experiments, i.e. agents think about the common good rather than trying to reach their opportunistic goals. Trust is thus a social innovation which makes human beings to go beyond their self-interested rational calculation. In repeated games and multi-period experiments appears that trust is formed as there are more incentives to act reciprocally in multi-period or infinite-period settings (Lundberg & Pollak 1994; Harisalo & Miettinen 2010). This would suggest that the personal discount factor's, i.e. time preferences have an impact on the level of trust in supply chains – the higher, the less trusting behavior.

Castelfranchi and Falcone (2010) describes in their book “Trust Theory” that the prisoner's dilemma situation in the context of trust is a belief that the trustee Y will act favorably to the trustor X even if this act would not be **the most convenient one** from the point of view of his most selfish private motives. This means that when X trusts Y, and Y is responding favorably, Y is adopting some of the X's motives, i.e. showing signs of empathy and altruism. However, they underline rationality does not equal selfishness.

The literature review of this section would indicate that the explanatory power of knowledge-based trust is greater than the calculus-based trust as the rational calculation cannot fully explain why people act reciprocally, not selfishly, in these game-theoretical settings. The game-theoretical setting is elaborated more in section 3, where the theoretical framework (Framework A) is formed.

## 2.3 Trust and Supply Chain Management

How should we study trust relationships further to get a sound and holistic picture of trust phenomenon in supply chain context? This section, 2.3, focuses on how the trust theories and concepts, reviewed in section 2.1 and 2.2, are related and applied in supply chain management context.

The philosophy of Supply Chain Management (SCM) is seen as a system approach of looking the whole supply chain as larger than the sum of its parts; the chain as a single entity rather than a collection of fragmented functions (Ellram & Cooper 1990). Supply Chain Management can thus be seen as *an approach to strategically coordinating business functions within and across firms in the supply chain for improving the long-term performance of the companies and the supply chain as whole* (Mentzer et al. 2001). The goal and motive of SCM are to increase the competitive advantage of supply chains.

Trust and commitment are the major prerequisites for contiguous companies to form a strategic and systemic view of their actions i.e. “Supply Chain Orientation” (SCO). If three or more interconnected companies have mutual SCO, they will likely start to practice SCM integration. Supply chain management leads to information sharing, shared risks and rewards, cooperation, integration of key processes, and long-term relationships. The consequences of these are lower costs, improved customer value and competitive advantage (Mentzer et al. 2001).

### 2.3.1 Trust in Supply Chains

Awareness concerning trust and its role in supply chain integration has been noted approximately since the late 1990’s. The more holistic supply chain collaboration mindset started to seriously challenge the traditional transaction cost theory by the end of 1990’s (e.g. Chiles & McMackin 1996). The new viewpoint was that as collaborating firms act together by sharing information, they have better chances to succeed in their strategic partnership. This first step of supply chain integration requires trust to work. The motto of the leading supply chain Professor Martin Christopher (1992) is “*Supply chains compete, not companies.*”

Trust creates value in organizations in several ways: it enhances information flow and knowledge quality (Chiue et al. 2006). According to Coleman (1988) resources, which the companies are willing to share, depends on the level of the trust. As information sharing is transparent to the parties, and their key operations are strategically aligned, they can plan together the production coherently and improve their operations. Predictable and open relationships help to decrease transaction costs within a supply chain (Gulati 1995).

According to Kwon & Suh (2004), “*trust is a critical factor fostering the commitment among supply chain partners.*” The results of Kwon & Suh’s study imply that trust decreases ‘behavioral uncertainty’ and thus transaction costs in the supply chain as trust encourages information sharing among parties. A supply chain environment, which lacks trust leads to a situation where every transaction needs to be verified and monitored, increasing transaction costs – and vice versa. The study also finds out that supply chain partner’s reputation in the market has an active role in the trust building process.

According to McGrath and Sparks (2005) “*A great deal of time and effort are typically directed at guarding against opportunistic behavior on the part of the other party*” in supply chain partnerships. Monitoring and gauging opportunism takes effort and thus create



transaction costs for parties. The atmosphere of trust decreases the need for contracting and monitoring.

A trust-based partnership by nature benefits both parties: stability, lesser organizational conflicts, and inclination and intention of working together and sharing information as well as benefits (Sahay 2003). In Sahay's paper, he refers to Lewis' study (2000), who states that the lack of trust is the most important reason why firms and their strategic relationships are not working as well as they should. Therefore, trust-building should be emphasized when building strategic relationships.

Building trust in supply chains have some essential preconditions. First of all, the parties have to value the benefits and costs of the collaboration. The effects of cheating and staying in the relationship should be determined (Sahay 2003). The parties have to be convinced that their targets are consistent with each other and the incentives to collaborate, not deceive, are high enough for each party.

Secondly, the other party has to be predictable (Sahay 2003). The other party's reputation should be examined for the trustor to be convinced about his benevolence. This underlines again the fact that trust and reputation can be seen as a "track record" of past success of the company, i.e. capital. Trust can be as well based on recommendations i.e. reputation transference process "word-of-mouth".

Based on this part of the literature review, the following hypothesis is formed:

**Hypothesis 4 (H4):** "Trust is the most important prerequisite for successful supply chain management."

### 2.3.2 Factors affecting trust in supply chains

As trust has the potential to lower transaction costs of the organization and enhance the collaboration, the factors which lead to trusting behavior in supply chains, should be examined. Trust exists if the collaborating companies have the confidence in the partner's reliability (Morgan & Hunt 1994). This leads the company considering partnerships to reflect whether relying on the other one and thus accepting vulnerability, will bring more benefits than what the risks are of collaborating or not.

Some of the key factors affecting trust in a supply chain are *asset specific investments*, *information sharing*, *partner's reputation*, *perceived satisfaction or conflict* and *behavioral*



*uncertainty*. Kwon's paper (2004) studies these factors in the context of supply chain management.

*Specific asset investment* means that the company is investing in certain assets, which are dedicated specially to collaborating with a certain partner, i.e. they have a higher value in particular relationship than outside of it (Klein 2010). This means that the switching costs are high for these investments when changing partner, and therefore the commitment to this partnership could be assumed to be longer-term and deeper than usual. Company A investing in a machine, which can be only used to produce unfinished products/components for company B, makes company A vulnerable for the choices of company B. Therefore, high amount of trust and usually some contracting is needed. A making this commitment signalizes to B that A is taking the relationship seriously. Asset-specific investments can be understood more broadly than the term 'investment' is usually considered. Besides machines and other 'traditional tangible investments', it also includes human capital, firm-specific knowledge, and R&D resources.

*Behavioral uncertainty* refers to the inability to predict the partner's behavior or changes in an environment (Suh & Kwon 2006). If the supply chain partner is unpredictable, it will lower the trust in the supply chain as transaction costs rise because of increased monitoring and low predictability. Uncertainty arises from difficulties of monitoring the performance of transaction partners (Williamson 1985). Tackling the bullwhip effect will be hard in this situation. Behavioral uncertainty has a great statistically significant negative effect on trust in supply chains (Kwon 2004).

*Information sharing* is a key concept in the modern supply chain management literature. It is one of the most important innovations of modern SCM and has become an intensively studied field (Choi 2010). Sharing data, say demand forecasts, inventory data and lead time estimations will help the parties to coordinate their actions minimizing "slack" and the use of unnecessary big inventory buffers, and so forth. Sharing and coordinating information right is one of the most essential ways to tackle the bullwhip effect and as well decrease the behavioral uncertainty in supply chains. Sharing information implies as well vulnerability, so the act is trust associated (Mishra 1996). Sharing information requires as well transparency and appropriate IT infrastructure to be efficient.

As it is concluded in previous chapters, *reputation*, formed in a temporal process of partners trusting each other, is a sign of one's history as a reliable or unreliable partner. As the

reputation of a company can be communicated, for example, by word-of-mouth of (un)happy previous collaborators, it is assumed that reputation plays a role in trust-building. Trust and reputation can be propagated through references, recommendations, and customer reviews. It is fair to assume that, there is a vast amount of information about a company's reputation in the markets. One of the concepts for trust propagation is the company brand, "a certificate of proven quality." Blomqvist and Ståhle (2004) confirms as well the effect of reputation on trust building. They add that reputation includes as well the notion that one must prove oneself to be competent in addition to being reliable.

*Perceived satisfactions* refers simply to the perceived experience whether the service provided or good sold is meeting the expectations or not. Perceived seamlessness and efficiency leads to satisfaction and thus to higher reputation and builds up trust further.

The study of Kwon (2004) got statistically significant support for its hypothesis of positive impact between **assets specific investments** and trust. The link between behavioral uncertainty and lack of trust was even more important. Information sharing reduced significantly 'behavioral uncertainty', which in turn increased trust. In addition, 'partner's reputation' has a significant impact on the level of trust. This finding indicates and confirms the common notion of trust-literature that every individual carries the burden or blessing of their reputations with them. '*Partners reputation*' had the highest regression value of the variables in the study with a p-value less than 0,05 indicating a statistically significant relationship.

### 2.3.3 The demand for trust in supply chains

What are the fundamental reasons for trust having such a high importance on successful supply chain management? We should study this theme more closely to understand how supply chain dynamics work and thus why trust is so important for supply chains. The high demand for trust emerges in supply chains in situations where there are both asymmetric information and uncertainty (Agarwal et al. 2007). The parties need confidence that their partners are not willing to exploit their vulnerability.

Cristopher and Lee (2001) argues that complexity and uncertainty can potentially drive supply chains into chaos (Figure 7). Factors like overreactions, mistrust, and distortion of knowledge are some of the most common factors why supply chains become often "nervous," meaning that the parties in supply chain perceive the collaboration to be not under control. This

leads to higher volatility and inefficient inventory buffers, as everyone in the chains wants to secure their position. This nervousness leads to a short-term focus and sub-optimization instead of long-term focused holistic supply chain management. Trust is demanded for the supply chain not to be driven in chaos.

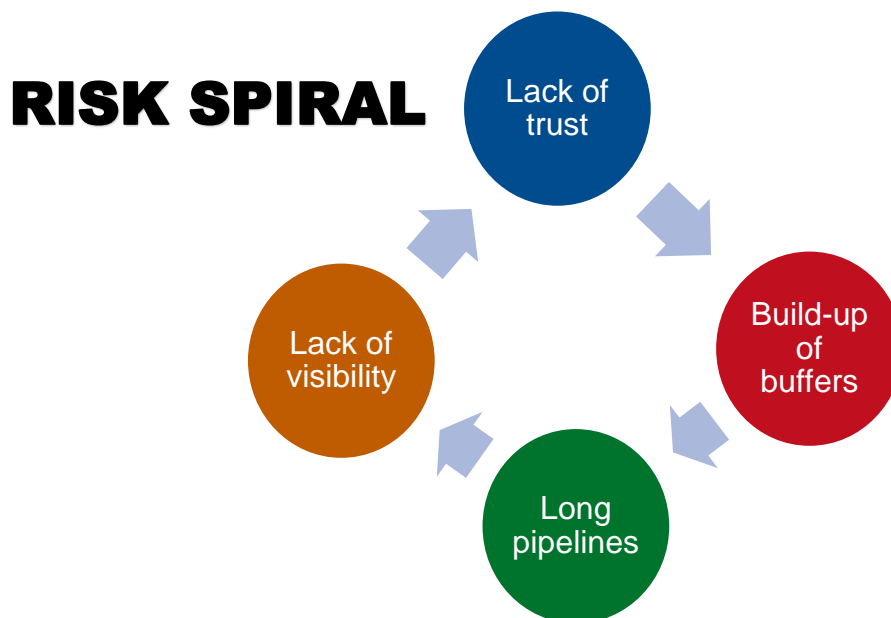


Figure 7: The Risk spiral according to Christopher & Lee (2001).

Nervousness will eventually lead to the *risk spiral*, where confidence in order cycle time, given demand forecasts, delivery capability, manufacturing capacity, quality management, and service delivery will be lost Christopher and Lee (2001). If trust weakens, the parties in the supply chain start to build up buffers to decrease their risk of running out of stock. This situation leads to longer pipelines, which ends up to the lack of visibility. Decreased visibility decreases the trust in supply chain, and the vicious cycle has emerged (Figure 7). As Christopher (1992) argues “*supply chains compete, not companies,*” the result might be that in the long run, all parties in the chain loses; supply chain risk will likely materialize in economic terms.

As chaos emerges in the supply chain, the bullwhip effect will be more volatile leading to unpredictability. The supply chain will become more “nervous” and inefficient (Christopher & Lee 2001). Preventing this nervousness and chaos, which leads to mistrust, creates the demand for trust in supply chains. Supply chain management cannot be efficient if the

fundamental of trust is lost, and parties in the supply chain focus on hedging their own risks and starts to sub-optimize on the expense of the totality.

### 2.3.3.1 The bullwhip effect

The concept of bullwhip effect explains why collaboration in supply chains has to be confident and trust is needed as Christopher and Lee (2001) argues. The phenomena refer to the fact that the (even small) swings in customer demand are usually amplified the more, the further in supply chain we go, away from the original demand signal. Even little volatility in customer interface (downstream of the SC) can lead to a considerable volatility in the upstream of the supply chain. The longer the chain, the greater the effect becomes (Chen et al. 2000). This means that every new party, which increases the length of the supply chain, increases the amplitude of this effect in the upstream of the supply chain (Lee et al. 1997). The mechanism works like a bullwhip (See Figures 8 & 9).

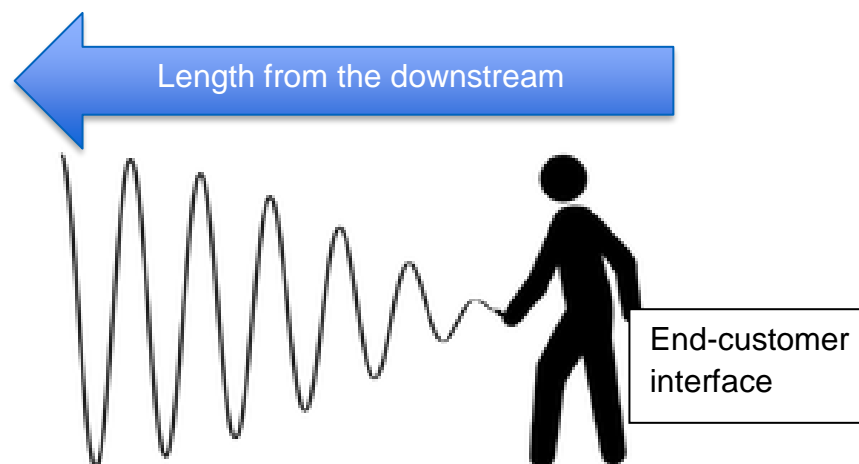
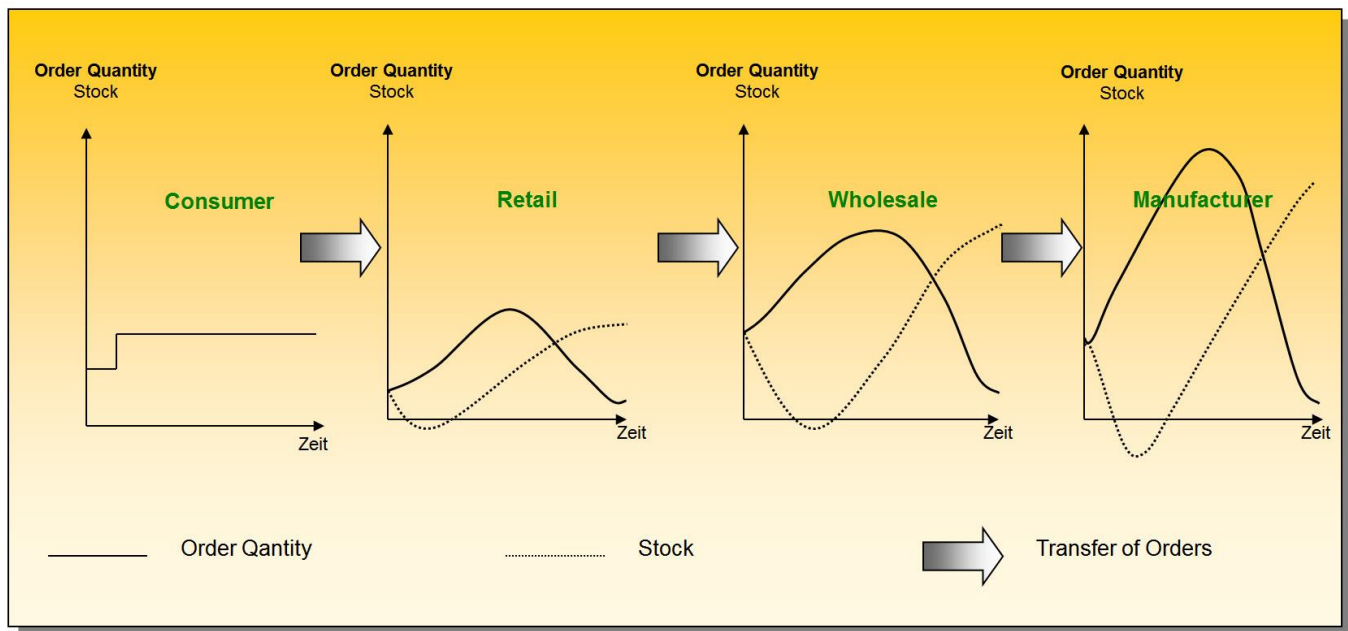


Figure 8: The bullwhip effect. CC BY-SA 3.0 (wikimedia commons).

If the parties in a supply chain do not cooperate, communicate or change their information and forecast estimates enough, they are unable to predict the demand and thus they will build up high safety stocks and drive the supply chain eventually in chaos (Christopher & Lee 2001). The greater the safety stocks, the less is the organization able to be ‘lean’ and efficient and the more they have slack, i.e. additional capacity only to deal with the uncertainty.

Figure 9: Bullwhip effect in a supply chain (CC BY-SA 3.0, user Grap, wikimedia commons).



More importantly, acting in this type of supply chain is by its nature very uncertain and volatile as the *Beer Distribution Game* -experiment founded by MIT demonstrates efficiently. The lack of communication even in a simple experiment creates a high amount of inefficiency and behavioral uncertainty (Thompson & Badizadegan 2015).

To tackle this effect, the supply chain needs to recognize the problem and coordinate its production with some forecast-driven model. This means the companies in the supply chain needs to communicate and share information about their stock levels, production plans, and inventories as well as lead times. The party in the customer interface needs to share historical data and conduct forecasts about anticipated future demand so that the whole chain can act accordingly in harmony, and therefore minimize additional safety stocks.

Implementing the right processes to tackle this effect requires a high amount of trust in the supply chain as new technologies and several inter-organizational policies, processes, and decision-making mechanism has to be established.

Tackling bullwhip effect requires communication, sharing of information and processes aligned accordingly. Supply chain management is essentially about managing information flow (Lambert et al. 1998) and inter-functional coordination (Mentzer et al. 2001) in the chain.

Tackling the bullwhip phenomenon efficiently creates high demand for trust and is essentially one of the root causes why ‘supply chain management’ is needed in the first place. It also strengthens one of the assumptions of this thesis that “trustful collaboration” is the

fundamental key to efficient supply chain management, not necessarily the newest technologies. Based on this part of literature review the following hypothesis is made:

**Hypothesis 5 (H5):** “Sharing information among supply chain partners increases the level of trust in the supply chain.”

#### 2.3.4 Social capital

Social capital can be associated in the context of supply chain management as the human element of the research field (McGrath & Sparks 2005). The topic is relevant for this thesis because *social capital* is highly related to the concept of *trust capital* in which this study partially focuses on.

The idea of social capital in supply chain context includes the traits of learning, trust, and innovation, which are “*created and enhanced during interpersonal interactions*” (McGrath & Sparks 2005). **Social capital affects the level of trust in supply chains positively.** Cohen and Prusak define social capital as “*the stock of active connections among people: the trust, mutual understanding and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible*” (2001 as cited in McGrath & Sparks 2005).

Social capital allows the companies in a supply chain to focus on the essential value-creation instead of guarding their interest against opportunistic behavior. It lowers transaction costs and allows the company to be more efficient. Maula et al. (2003) argue “*The more firms can build and leverage social capital in their internal and external relationships, the argument goes, the greater will be the potential value creation benefits that firms can expect as a result.*” Coleman (1988) defines the core elements of social capital to be networks between actors.

A study conducted by Krause et al. (2007) finds support to the hypothesis “*the performance of buying company is positively related to buyer commitment and social capital accumulation with key suppliers.*” The firms that are acting together create a sort of “cognitive capital” as they understand each other, way they behave and their needs better. This capital creates more flexibility, better product quality and increases the performance of the supply chain. Commitment to a longer-term relationship is the prerequisite for these benefits. From perspective of trust building, the social capital factor is mostly related to the context factor ‘C,’ described in section 2.1.2.

Müller (2014) summarizes (Table 2) the benefits of social capital in supply chains as follows. Social Capital gives several advantages in different decision points when managing a supply chain. The benefits include increased flexibility and performance. The study concludes that increased *cognitive capital* in the sense of deepening understanding of the partner is highly sensitive for acquiring cost improvements. According to the study, the theory of social capital grants a deeper perspective to supply chain management compared to the traditional transaction cost theory, which is a relevant argument concerning the 4<sup>th</sup> research question of this thesis.

Table 2: Improvements of supply chain collaboration with social capital according to Müller (2014).

Decision points	Make or buy Accurate risk assessment through informal information	Sourcing strategies Ensuring conformity among offshore suppliers	Supplier strategies Establishment of a deeper and more valuable relationship	Contracting Creating a win-win situation
Social Capital Theory	<ul style="list-style-type: none"> <li>- High information sharing</li> <li>- More bargaining power due to unique access to information and resources</li> <li>- Better risk assessment</li> </ul>	<ul style="list-style-type: none"> <li>- Improved relations with offshore suppliers</li> <li>- Continuous progression of competencies and skills of employees</li> <li>- Encouraged information sharing</li> </ul>	<ul style="list-style-type: none"> <li>- Enhanced obtainment of benefits of supplier development</li> <li>- Beneficial value adding on both sides</li> <li>- Creating of competitive advantage</li> </ul>	<ul style="list-style-type: none"> <li>- Partnership formation</li> <li>- Establishment of trust among contract partners enhances beneficial outcomes for both side.</li> </ul>

## 2.4 The nature of knowledge and social reality in supply chains

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*“While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence all knowledge is either tacit or rooted in tacit knowledge. A wholly explicit knowledge is unthinkable.” – Michael Polanyi (1969)*

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Given the collaboration and trust between people and firms in a supply chain is pivotal for the supply chain collaboration to be beneficial, it is relevant to study the nature of knowledge between people and how it can be managed in an organization. From this point of view, it is crucial for the whole supply chains to engage sound knowledge management across the parties involved. In further this section, 2.4, the nature of knowledge and social reality is studied *to understand the circumstances and the human context where trust is accumulated and needed.*

### 2.4.1 Two categories of knowledge

English philosopher and political theorist, Michael Oakeshott divides knowledge into two categories: practical and scientific knowledge (Oakeshott 1991). Nobelist F. A. Hayek and Michael Polanyi creates a similar distinction by dividing knowledge into two categories: the first one is explicit knowledge, which can be articulated. The other category is tacit knowledge, which is practical and hard to articulate (Table 3).

As an example, driving a bicycle is tacit knowledge, as it is hard to articulate; one just learns it by a process of trial and error. Forming trust happens as well unarticulated by the subjective evaluation of the trustor. It involves evolutionary-like trial-and-error experimenting as well as reciprocity.

Hayek's (1988) distinction is that knowledge is either centralized or dispersed. A cornerstone of his theory of Austrian economics is that essentially all knowledge is widely dispersed across people in an economy and thus it is impossible for a planned economy to be efficient, as it is impossible to transfer or process all the relevant information by a central planner (Hayek 1988). Communicating *specific knowledge* within an organization can be costly and hard. The implication is that organization dealing with tacit information should be decentralized by their nature (Lazear and Gibbs 2009).

Table 3: Two types of Knowledge (Huerta de Soto 2008).

Types of knowledge	Type 1 (explicit)	Type 2 (tacit)
<b>F. A. Hayek</b>	Centralized	Dispersed
<b>Michael Polanyi</b>	Articulate	Tacit
<b>Michael Oakeshott</b>	Scientific (technical)	Practical (traditional)

Oakeshott argues that the fundamental nature of all knowledge is practical and subjective. He criticizes the type of rationalism, which does not recognize the primary type of knowledge to be practical, but that "*there is no knowledge which is not scientific/technical knowledge*" (Oakeshott 1991).



Hayek (1988) and Huerta de Soto (2008) argues that social institutions such as habits, traditions, institutions, and juridical and moral rules, which make society possible, are deeply inarticulate by their nature. Human beings learn to follow these institutions by gaining practical knowledge through living in reality, though they might not know the complexity or “reasoning” behind these institutions. People are used to adapting to their social environment and its rules.

According to Huerta de Soto (2008) the link between type 1 and type 2 knowledge (See Table 3) is complex. All scientific information is fundamentally based on practical knowledge. However, the accumulation of better scientific knowledge also allows better use of practical knowledge. Thus there is a two-way link between these knowledge categories. The scientific (or explicit) knowledge is accumulated from the foundations of practical knowledge. Polanyi (1969) argues all knowledge is fundamentally tacit by its nature or at least rooted in tacit knowledge because the explicit knowledge is always tacitly understood and applied. In this sense, tacit knowledge can be viewed as the “first order knowledge”.

From the perspective of this study, the key epistemological finding is that the *explicit articulate knowledge is always based on the tacit/practical knowledge*. The inarticulate, tacit knowledge is a result of a temporal process formed by experience and is often hard to describe in words. Building trust is about creating subjective evaluations of the other parties in the supply chain based on their action. Trust-building happens step-by-step evolutionary as the agent X acquires information about the trustee Y. The trustor must gather information about agents whether or not they can be trusted. This process is therefore essentially tacit.

From the point of view of supply chain integration, interpersonal relationships between corresponding actors across the companies should be established for them to create common understanding. This involves especially the communicating and sharing of tacit knowledge, which can be hard and costly to transfer. It is crucial because failure to communicate is one of the main reasons why strategic supply chain alliances many times fail. Studying the nature of social reality and human knowledge helps, therefore, to understand how trust is formed.

#### 2.4.2 Knowledge management in supply chains

As we notice from the previous section, there are broadly two categories of knowledge explicit and tacit ones. It is thus important to examine the many natures and types of knowledge as collaboration in supply chains is highly built on competitive advantages, which require open

sharing of knowledge (Barrat 2004). From the point of view of trust-building, we should study how trust enables the process of knowledge management, sharing, creation, and exploitation.

The study conducted by Schoenherr et al. (2014) suggests that supply chain knowledge management influences the supply chain performance. They argue that suppliers are not only there to provide goods and services, but “*key repositories of knowledge and capabilities*” for buyers and vice versa. High social capital between the parties in the supply chain has a strong effect on this information accumulation (Adler & Kwon 2002).

Supply chain members contribute to the common “knowledge pool” simultaneously elevating the sophistication of the knowledge. Supply chain knowledge management is therefore about collecting pieces of information within the chain and processing it to build competitive advantages. Therefore, organizations should establish processes to acquire knowledge and to converse it to meaningful understanding (or cognitive capital) and to be able to apply the information by utilizing it for the good of the whole supply chain.

According to Fawcett et al. (2012) “*Trust is at the heart of a collaborative innovation capability. Without a foundation of trust, collaborative alliances can neither be built nor sustained.*” When there is trust in the supply chain, the actors in companies are allowed to access unique and more informal information through the *weak ties*. Mantel et al. (2006 as cited in Müller 2014) argue that “*the informal sources of information are more credible and deliver higher quality information.*” These weak ties are accessed by interpersonal relationships. Supply chain management requires, therefore, knowledge of relationship-building skills (Kwon 2004). This indicates that building trust is crucial in terms of knowledge management in supply chain collaboration.

The possession of “*valuable, inimitable, rare and non-substitutable knowledge*” can be seen as a competitive advantage for an organization (Grant 1996; Spender & Grant 1996; Schoenherr et al. 2014). The knowledge, which is generated through the interaction of the parties in the supply chain, can potentially improve the interface between parties by enabling better integration and enabling more efficient supply chain processes. In fact, *the mutual generation and exploitation of knowledge itself is the main driver for supply chain relationships* (Lanier et al. 2010). This fact concerns both tacit and explicit types of knowledge.

#### **2.4.2.1 The role of explicit knowledge in supply chains**

Explicit knowledge is considered as easier to conceptualize and articulate as the tacit information. It is as well easier to communicate in manuals, forecasts, company policies, regulations and market data. An ordinary example of this would be for instance companies communicating statistical forecasts with each other to adjust their production according to predicted demand.

Typical ways of transferring this type of knowledge in an organization include structured meetings, archive storages, shared databases and so forth. The shared explicit information increases the supply chain performance according to Schoenherr et al. (2014) but does not so as efficiently as tacit knowledge.

#### **2.4.2.2 The role of tacit knowledge in supply chains**

There is a remarkable distinction between explicit and tacit knowledge. What is interesting from the point of view of this study, is the fact that the *tacit knowledge*, i.e. non-explicit and hard-to-communicate knowledge, has a stronger effect on the supply chain performance than the explicit knowledge (Schoenherr et al. 2014).

When communicating, the supply chain partners create a common social reality. Tacit knowledge is made easier to flourish in group sessions such as brainstorming, lobby discussions, coffee breaks, formal meetings, informal meetings and communication between cross-company specialist (Schoenherr et al. 2014). In logistics and supply chain context it is important that the individuals across companies who are at the interface points between businesses in supply chains have right conditions to communicate their explicit and tacit knowledge.

The collaboration between parties in the supply chain network requires the exchange of ideas to happen in an open environment with an as low threshold as possible. This allows a higher level of thinking as other supply chain members build their ideas on each other's experience & knowledge and share their understanding by having creative dialogue. No parties should be feeling that they need to be reserved (Harisalo & Miettinen 2010).

Tacit knowledge is difficult to transfer, but it is useful as it is tough to replicate i.e. it is unique and complex. As Polanyi puts the words: "*We know more than we can tell.*" Squeezing the tacit knowledge out from the interactions of supply chain collaborators creates valuable knowledge resources for the companies. As tacit knowledge is harder to imitate by competitors,

it is more likely to be a more sustainable competitive advantage than explicit knowledge, which is easier to imitate.

Taking this finding into account, building trust requires better ways to communicate tacit knowledge between supply chain parties. Trust building is essentially about acquiring tacit, experience-based, knowledge of the trustee in a temporal process.

According to Schoenherr (2014), open sharing of knowledge allows the increase of supply chain performance. A crucial precondition for this is trusting as it is demonstrated earlier in this thesis. When supply chain parties collaborate, they will be able to create a more elusive type of tacit knowledge. This implies pairing the different parties to be able to share ideas (Schoenherr et al. 2014). Tacit knowledge is about making sense of available information in complex realities and acquiring new viewpoints to create new meanings (Nonaka 1994).

Koka and Prescott study the strategic alliances of firms operating in the steel industry in their paper published 2002. They found out that the theory of social capital, based on trust, explains three benefits of collaboration regarding information sharing. They are *information volume*, *information richness*, and *information diversity*. Out of these three benefits, only **information richness** is significantly dependent on the “*experience and history of the companies in this relationship*.” This finding supports the observation that the sharing of the highly rich and valuable, but elusive, information improves in a *temporal* trust process between the companies as trust capital is accumulated.

As a conclusion of this theorization, tacit knowledge enables even a greater effect on the performance of the supply chain than the explicit knowledge. Tacit knowledge is more context specific and ambiguous and cannot be copied or imitated as explicit knowledge. This is true because tacit knowledge is more often “*valuable, inimitable, rare and non-substitutable*” as Grant (1996) describes the main properties of the type of knowledge, which creates sustainable competitive advantages for organizations. This process is heavily dependent on the level of trust between organizations.

### 2.4.3 Collective learning in supply chains

As we have discovered, the right type of valuable tacit knowledge is a fundamental key to sustainable competitive advantages for the supply chain. This implies that it is beneficial to study the organizational structures, which enable knowledge creation and enhancement. The

concept of *collective learning* is important in the context of supply chain management as it describes how knowledge (explicit and tacit) is created and flourished in the supply chains (Ghosh & Fedorowicz 2008). It is related to the concept of *cognitive capital*, i.e. learning by collaboration. A framework for supply chain coordination and governance should be established.

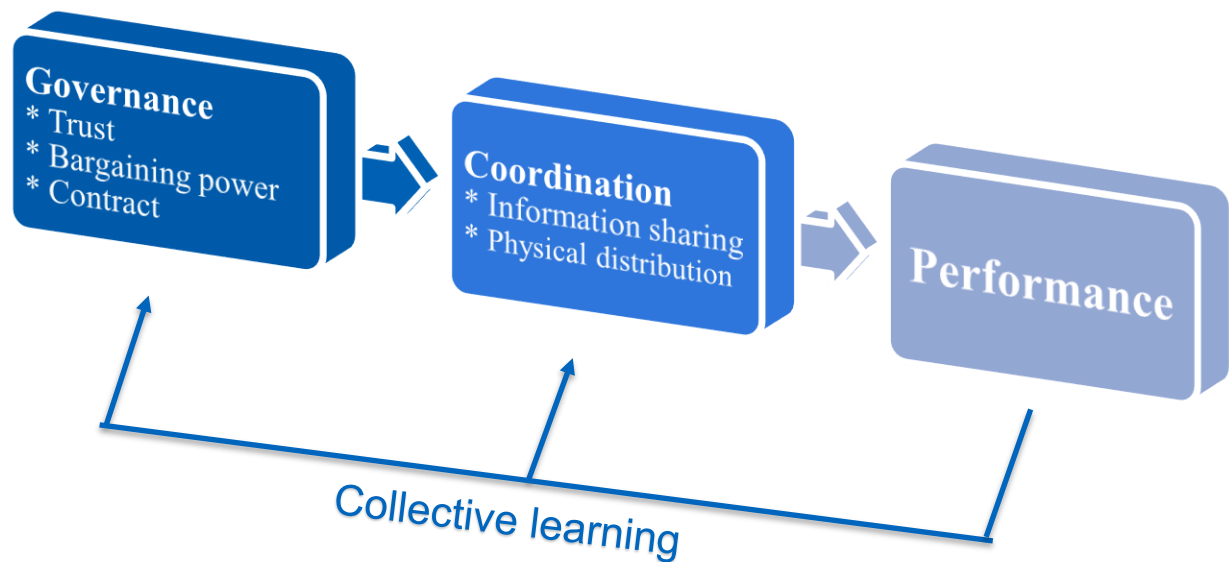
The results of coordination and governance in supply chains lead to a feedback system and collective learning when supply chain shares its information among parties involved. The collective learning is related to trust: it is a process where knowledge is created in a multi-period temporal setting. As the coordinating of the supply chain is centralized and the governance framework is solid, the members can learn from each other's mistakes and best practices. The parties also learn that neglecting information sharing leads to sub-optimal performance (Ghosh & Fedorowicz 2008).

Collective learning as well creates circumstances for innovations to flourish as the product development, and R&D is coordinated in the feedback process (Simatupang et al. 2002). An innovative environment requires trust and openness, which allows people to speak up about their minds and also to have differing opinions (Prather 2000). Collective learning creates a learning curve for the organizations and deepens the trust between the participants in the process. These situations can be potentially used to share knowledge and create new information to be exploited by the organization.

Conditions to collective learning should be established as it makes possible for the supply chain to take advantage of its parties' knowledge resources. It should also be noted that learning to work in a team is as well process learned by time. "*Supply chain collaboration can be only learned by supply chain collaboration*" and therefore the learning process with a feedback link is essential (Ghosh & Fedorowicz 2008).

Based on these findings, it could be argued that collective learning increases cognitive capital in the supply chain and grants access to silent knowledge on how the other parties in supply chain think, act and comprehend the social reality. An atmosphere of trust lays a cornerstone for this process as Figure 10 indicates.

Figure 10: Collective learning (Ghosh & Fedorowicz 2008)



Based on this part, I form the following hypothesis:

**Hypothesis 6 (H6):** *“Finding the right ways of cooperation in supply chain that works, takes time and is an iterative process of trial and error by its nature.”*

## 2.5 Trust and transaction cost economics

As it was discussed in the introduction section and literature review, there is a conflict between the calculus-based theory of trust and the knowledge-based theory. The calculus-based theory is associated with the *transaction costs economics* (TCE), which is covered in this section. It is unclear, which of the two theories have more explanatory power in supply chain management context.

The calculus-based theory is mostly founded on the disciple of microeconomics and rational calculation, while the theories emphasizing knowledge-based trust are more interdisciplinary (elaborated in the previous sections). Referring to research question 4, it is finally studied in the empirical section which of the theories have more explanatory power in supply chain context (see section 4.4.2). Therefore, the theory of calculus-based trust is reviewed in this chapter.

Williamson (2008) discusses the relationship of supply chain management and transaction cost economics (TCE) in his research paper in the April's 2008 volume of *Journal of Supply Chain Management*. He questions the issue that whether the encompassing nature of SCM gives too many degrees of freedom so that basically “*anything can be explained as supply chain management.*” Therefore, it is reasonable to review some literature on transaction cost economics/analysis of supply chains and especially their views on trust.

Williamson (2008) assesses trust in supply chain context through transaction cost economics (TCE) point of view. The transaction cost theory in supply chain collaboration is based on the notion that the heaviest risks in collaboration are highly related to firm's asset specific investments. In transaction economics point of view, non-asset specific products might be purchased through efficient markets without complex contracting and arrangements (Williamson 2008). There is no need for the seller and buyer to integrate their processes with each other so heavily because there are zero risky asset specific investments needed.

However, when asset specificity from the partner is required, the firm needs to think about whether to “make or buy” carefully. If the goods or components needed requires asset specific investments from the supplier, there have to be made a decision whether the supplier gets some safeguards from the buyer. “*The fact that transaction-specific investments cannot be easily redeployed gives rise to a safeguarding problem, which can result in potential costs*” (Suh & Kwon 2006).

If no safeguards, such as contracts on long-term collaboration, are granted, the seller might ask for a high premium, because asset specific investments are very risky. Asset specific investments can turn out to be a high financial burden for the seller if the buyer decides to stop the collaboration and the seller is left with high sunken costs of the firm-specific asset investment, i.e. realizing risks of collaboration (Williamson 2008).

If the safeguards are needed: there are two alternatives: hybrid contracting (equivalent to supply chain collaboration) and complete vertical integration (make it yourself). Hybrid contracting should be assessed from the point of view that how complex contracting and other arrangements are required. If the contracting needed is too complex, the transaction costs are much higher than those of making the product by the company itself. In this case, vertical integration and internal production should be established further (Williamson 2008).

Transaction cost economics (TCE) literature tends to view the role of trust more from the perspective of calculative trust than from the knowledge-based perspective. The transaction



cost analysis and its calculus-based view on trust seem to conflict with the knowledge-based theory, which is interesting from the point of view of this study. Therefore, questions about the explanatory powers of these theories should be asked and tested.

Suh and Kwon (2006) argues that calculative-based theory of trust has better explaining power than the knowledge-based theory of trust in supply chains. Their study claims that firms' trust in their supply chain partner is highly related to the partner company's *firm-specific investments*, i.e. "*variety of relationship-specific investments, including both specialized physical and human capital, along with intangible such as R&D and firm specific knowledge*" (Shelanski & Klein 1995).

From Suh and Kwon's calculus-based trust perspective, it is important that the partner company demonstrate a deep commitment to investing in the relationship and thus showing that they are seriously long-term committed in the partnership. They view that "matter comes over mind" i.e. concrete acts and investments create a more profound base for trust than studying the "minds" of the partner, i.e. the knowledge-based view. However, McAllister (1995) argues that rational choice and calculative explanations for trust are limited and narrow perspectives for trusting because they fail to provide any explanations about the cognitive and affectional side of trust.

Suh and Kwon find a low amount of evidence on the knowledge-based theory that trust is built in a temporal process by time with learning about the other participant because in their study the variable *years in partnership* does not explain at all statistically significantly the level of trust in supply chain collaboration. If knowledge-based theory had higher explanatory power, a relationship would be found. This creates tensions with the literature, which promotes the knowledge-based view.

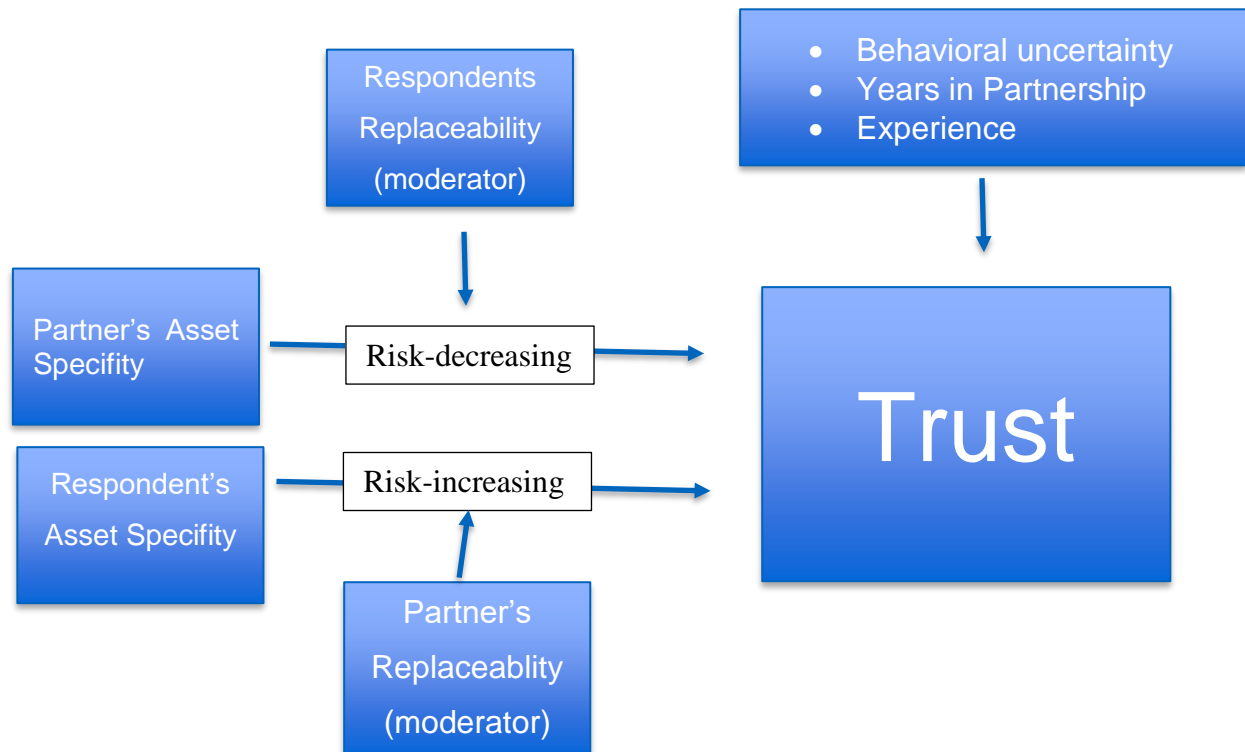
Based on their framework Suh and Kwon finds a highly statistically significant evidence that partner's asset specific investments create trust. However, this effect is smaller when the respondent firm is highly replaceable, i.e. the effect of asset specify on trust is moderated in this case. No evidence of *years in partnership* or *experience in supply chain management's* positive or negative relationship with trust was found. Furthermore, behavioral uncertainty had a great statistically significant and strong effect on trust.

Based on this section and the conflicting views of knowledge-based and calculus-based trust as the most explanatory form of trust, the following hypothesis is formed:



**Hypothesis 7 (H7):** “Knowledge-based view on trust explains better the phenomenon of trust in supply chain context than calculus-based trust.”

Figure 11: Conceptual framework of Suh & Kwon (2006).



## 2.6 Ways to enhance trust building in Supply Chains

As the fifth research question of this thesis is related to study the ways how trust building can be encouraged to increase the performance of supply chains, it is necessary to explore the aspect further in the literature review section. The focus is reviewing existing literature from the perspective that what kind of normative solutions companies should implement to encourage trust-building and thus increasing performance. This part focuses on more concrete proposals in contrast to the much more theoretical previous sections.

### 2.6.1 Affinity groups

One solution for increasing social capital in supply chains and thus building trust are the ‘affinity groups,’ i.e. “*semiformal groups that cut across the supply chain structure*”. They are

formed based on responsibilities and duties of the individuals in a supply chain network opposed to the organizational division to departments and divisions (McGrath & Sparks 2005).

Affinity groups are a way to build more social capital and thus trust among the supply chain partners. These groups consist of peer members who share the same responsibilities, similar roles or job titles in different organizations in the supply chain (McGrath & Sparks 2005). This means that their work in different organizations is highly related to each other's work. As the people in affinity groups are professionals in their specific fields, they can share valuable information and thus create new (tacit) knowledge with the help of more informal channels, fostering the creation of silent knowledge, as described in section 2.4.2.2.

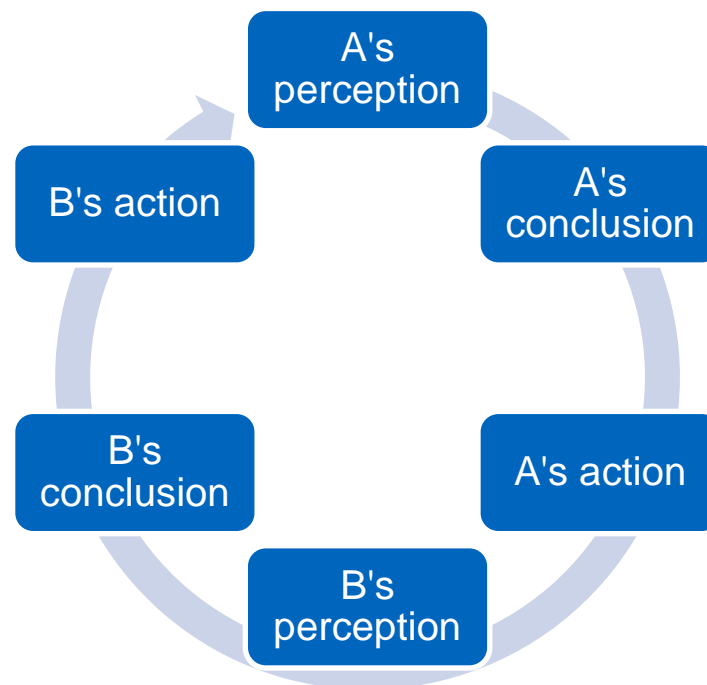
These networks can enhance the collective learning in an organization as the participants are allowed to share their thoughts and concerns about what is working and what is not. It can be thus assumed that affinity groups, a cross cut of the supply chain, is an enhanced form of collective learning as Ghosh and Fedorowicz (2008) describes this phenomenon. Team members do share critical information through the supply chain as for example logistics experts, marketing experts or R&D developers speak the same language ('jargon') with each other. This encourages creative problem solving and collaboration, as members can creatively think "*outside of their organizational box*" and thus solve shared problems efficiently (McGrath & Sparks 2005).

These examples highlight and suggests that it is beneficial for example for the people working in intersections between two companies, in a supply chain, to have an interpersonal relationship because they need to understand each other. Representatives of procurement unit of company A and sales unit of company B should work in close cooperation if the theory of social capital and affinity groups tend to be correct and beneficial for the companies. As McGrath and Sparks (2005) describe it, "*affinity groups, collegial associations of peers who meet on regular basis to share information and capture emerging opportunities, offer a unique opportunity to enhance supply chain management.*"

## 2.6.2 Signaling trust and commitment

In economics the aspect of signaling is a part of contract theory that describes situations when a party signalizes credibly some information about himself to the other party. A common factor is the existence of asymmetries of information: one of the parties knows more than the other. Therefore, it is beneficial to study carefully whether some signals about trusting are more credible than others. Theories about signaling are useful for example in the job market contexts (Spence 1973). Credible and reliable signaling is crucial in many economic contexts to tackle the negative adverse selection phenomena, such as in company IPO's. In order to be reliable, the signals have to be too expensive to be performed by the 'bad apples' in the markets (Leland and Pyle 1977).

*Figure 12: Interactive model of trust building (Zand 1972; Six 2007).*



In supply chain context it is relevant to study which actions build up trust. When starting a new companionship between organizations, it is necessary to signalize that the relationship is based on a genuine notion of commitment, reliability (Noteboom 2002) and mutual benefit, not on opportunistic behavior where one of the parties use the circumstances to exploit the gullibility of the other at the right moment. The parties should not get the feeling that one of them considers opportunism as a morally acceptable behavior in certain circumstances.

Creating interpersonal trust is a gradual process. Concerning signaling it is useful to notice the widely confirmed fact that beliefs create self-fulfilling prophecies (Zand 1997). This

underlines the importance of signaling about trustworthiness in the early phase of the relationships and giving good reasons for other party think favorably about the signaling party.

Zand 1972 describes trust as a process where trust building is interactive. According to Six and Noteboom (2005) *“People interpret actions as relational signals, on the basis of which they attribute a mental frame to others, and select their own frame as a basis for action.”* As trust is based on action, but more importantly on perceptions – the signaling effect is crucial when forming new interpersonal relationships. F. E. Six (2007) proposes four normative policies in his extensive framework to enhance inter-personal trust building in organizational context. These are:

1. the suspension of opportunistic behavior, or the removal of distrust.
2. exchange of positive relational signals (mutuality)
3. avoiding negative relational signals, i.e., dealing with trouble.
4. the stimulation of frame resonance, or the introduction of trust-enhancing organizational policies.

This framework encourages the companies to remove distrust between each other. This deals with any kind of attitude, which will wake concerns in the other supply chain member, that one is in the collaboration with a “strategically opportunistic motive”, i.e. deceiving when the time is right.

The solutions for removing distrust is the alignment of interest through credible commitments and with reputational data from third party endorsements (Six 2007). In supply chain context this could mean signaling with offering long-term contracts (Williamson 2008), making mutually asset-specific investments (Suh & Kwon 2005; Fawcett et al. 2012) and sharing voluntary information, and maybe even giving a discount to the other party if the organization is willing to share information and knowledge.

**Removing distrust** is the first prerequisite to for trust-building process to start. As beliefs are positive about the other party, a genuine trust-building and the positive self-fulfilling prophesy may start.

### **2.6.2.1 Organizational policies**

The fourth point of these normative proposals for enhancing trust building, *the introduction of trust enhancing organizational policies*, is something relevant to study more. The organizations might encourage by its policies the creation of inter-personal relationships. One application of

this is establishing autonomous affinity groups mentioned in section 2.6.1. The theme is tough wider than this.

As context has a significant effect on trust building, it is beneficial for the company to form policies and organizational structures, which encourage the formation of interpersonal trust. One of the most important points in this is creating a culture where relationships are important and showing care and concern for other people's needs. New employees should be accommodated to the shared values and principles of the organization (Six 2007).

If the employee needs to be controlled, it signalizes that the employer does not have trust in the subordinates. Bureaucratic control of employees often signalizes lack of trust (Das and Teng 1998). When signalizing trust, a right degree of freedom should be granted to the employee to give a sound signal of trust and thus to empower the subordinates.

Fawcett et al. (2012) suggest that in order to build trust in supply chains, the company should align right incentives for collaboration, i.e. there need to be some metrics and concrete goals established to reward trustworthy behavior. A company should cultivate a collaborative philosophy and establish trust building organizational routines. Trust is highly needed when for example a pilot project is conducted by the firms. Fawcett et al.'s model (Figure 13) is similar to Six's model and emphasizes the virtue of reciprocity and signaling of goodwill. As trust consists of goodwill and competence, both of these trust components should be highlighted (Fawcett et al. 2012). Building trust is therefore about building empathy, benevolence & goodwill among the parties. It is as much about building competence (skills, results, and know-how).

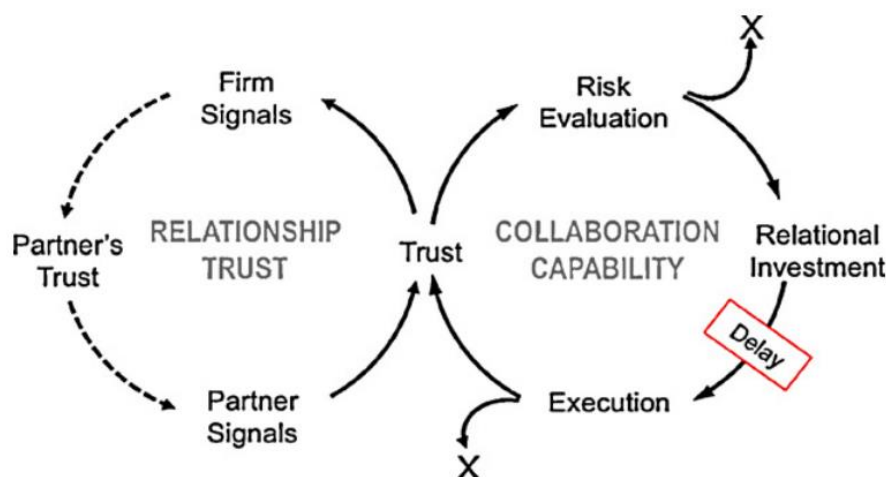


Figure 13: Fawcett et al's framework on Trust & Collaboration (2012).

### 3 Theoretical framework and hypotheses

Based on the literature review of this thesis I will continue to build a sound framework of trust-building from the perspective of supply chain management using the tools of game theory, discounted utility of finance theories and transaction cost economics (TCE) (Framework A).

In section 4 some theoretical implications based on this model are tested empirically by a questionnaire for logistics managers of companies whom business is heavily dependent on intensive supply chain collaboration. This section begins by making the theoretical argument why trust is fundamentally based on the tacit type of knowledge. Then the Framework A will be built further based on the literature review part.

#### 3.1 Trust as tacit knowledge

Based on the literature review section, it is reasonable to argue that *the attitude of trusting someone and building an evaluation of the trustfulness of someone is in fact deeply tacit knowledge*; hard to articulate, hard to communicate and dispersed. This is a cornerstone of the Framework A of this thesis (elaborated further in Section 3.2) and tested by Hypothesis 9 (H9).

The evaluation of someone's trustfulness is profoundly subjective, and all the nuances of this kind of assessment are hard to conceptualize in words. This evaluation is manifested through the actions of the trustor. When Saint Augustine was asked to describe 'What is time?', he got confused and answered: *"Before anyone asked, I knew what time was, but now as you ask me to describe it, I cannot say what time is."* Harisalo and Miettinen (2010) argue that the same situation is true with the concept of trust. They argue that it is hard to verbalize what people feel and think inside their heads when it comes to trust. Trust is thus complex and ambiguous in its core sense (Jarrat & Ceric 2015).

Tacit or practical knowledge is as well characterized to be acquired in an evolutionary process of trial and error. Tacit knowledge is acquired by learning through practical experience. It cannot be deducted logically as explicit knowledge often can (Polanyi 1958). Trust is as well only learned by interaction in practical context since forming trust is a process. Trust cannot be deducted with a fully rational *a priori* reasoning.

The third similarity with tacit knowledge and trust is that explicit knowledge can be stored in one place theoretically (like collections of encyclopedias and data banks), but trust and tacit knowledge cannot. The attitude of trusting is always subjective and depends on the

evaluator. Therefore, all the “trust evaluations” cannot be stored into a one place or database, as they lay in people’s minds as highly ambiguous and complex schemas and beliefs. Trust evaluations are dispersed in society and cannot be “stored” explicitly in one certain place since trust is subjective and context dependent.

*Table 4: Comparison of explicit knowledge, tacit knowledge, and trust. Based on Polanyi (1958).*

Explicit knowledge	Tacit knowledge	Trust (evaluation)
EK can be articulated easily and written down. Transferring explicit knowledge is easy.	Transferring tacit knowledge require intense and close interaction and to build shared understanding among parties. Difficult to transfer.	Trust is formed in a process where parties interact together and build evaluations based on each other’s actions. Deep trust requires shared understanding. Trust can be transferred by propagation.
Logical and deductive reasoning can accumulate explicit knowledge.	Tacit knowledge can only be acquired in relevant context by practical experience.	Trust is context dependent and subjective of its nature. Trust is accumulated through experience.
Can be aggregated in a single location and “stored” for future generations.	Personal knowledge that is dispersed across the mankind. Realizing this type of knowledge requires connecting with other one’s mindset and way of thinking.	Trust is dependent on the notion that who is the trustor. Trust evaluations are always by definition dispersed.

The notion of trust being complex phenomena is important to pay attention to since building and sharing tacit knowledge is a bigger competitive advantage than sharing and producing explicit knowledge. This observation hints that communicating, sharing and producing tacit knowledge should be heavily emphasized in supply chain collaboration. Taking into account the findings of Lanier et al. (2010) the mutual generation and exploitation of knowledge itself is the main driver for supply chain relationships.

Therefore, this theoretical reasoning suggests that the type of information, which increases the competitive advantage of the supply chain most - tacit knowledge, can be regarded as the most valuable priority of supply chain management. Creation of highly valuable tacit knowledge is not possible without the atmosphere of trust as the most sophisticated type of knowledge is created in interpersonal relationships; with people of similar mindsets. The creation of high-flying complex schemas, mindsets, perspectives, ideas and practical



knowledge (the forms of tacit knowledge) require all reciprocal interaction – trust building. This notion is highlighted the more information intensive the supply chain and its products are. Therefore, the following hypotheses related to the tacit knowledge in supply chains are formed:

**Hypothesis 8 (H8):** *“Collecting and exploiting tacit knowledge in the supply chain is one of the most important factors that enables a competitive advantage for the supply chain.”*

**Hypothesis 9 (H9):** *“The production and using of tacit knowledge in the supply chain partnership is related with high level of trust in the supply chain collaboration.”*

### 3.2 Framework A: Game theory, time preference, and trust

The game theoretical view on trust uses experiments such as the Prisoner’s Dilemma to study how human beings behave in situations where trust is needed (Harisalo & Miettinen 2010). As the literature review suggests, the experiment changes when a temporal dimension is added, people start to act more reciprocally by time.

Harisalo and Miettinen (2010) and many others describe trust as a process. The knowledge-based theory implies that trust is built on trial and error as the trustor’s knowledge of the trustee becomes higher and higher by time as they learn from each other and build a common mindset. Categories, which should be included in the frameworks based on these findings, are the *game theoretical approach* and the *temporal dimension*.

It should be noted that according to the existing literature (Section 2), trust is lost more easily than acquired. It is generated slowly in a **context ‘C’** with multiple parameters such as the cultural factors, nature of the social context, institutional aspects, contracts, tacit knowledge, social capital, the level of asset specify and so on. *In the Framework A of this thesis, trust is generated through a temporal process of reciprocity, reputation and increased trust (capital) in repeated prisoner’s dilemma games* as the Figure 14 demonstrates. The outcome of this process is the mutual net benefit (utility). The framework adopts features of Mui et al.’s model (2002) and extending it with the contextual component as well as an illustration about how trust capital is accumulated in this model, as the mechanics of trust accumulation is related to the 2<sup>nd</sup> research question.

Figure 15 sketches a possible scenario of trust-building in Framework A (Figure 14) from the point of view of the trustor. Trust is built slowly but can be lost easily because people tend to be risk-averse. In this framework, trust is formed by small steps in a process gradually



(a), but potentially lost in a greater amount if the other agent is considered to act non-reciprocally (deception) (b). The incentive to act according to *reciprocity norm* is formed as reputational mechanisms punishes heavily someone who is deemed to play unfairly against the established institutions such as common rules which the actors have agreed on. Trust can, however, be re-established, but that is harder after trust is considered to be lost once (c).

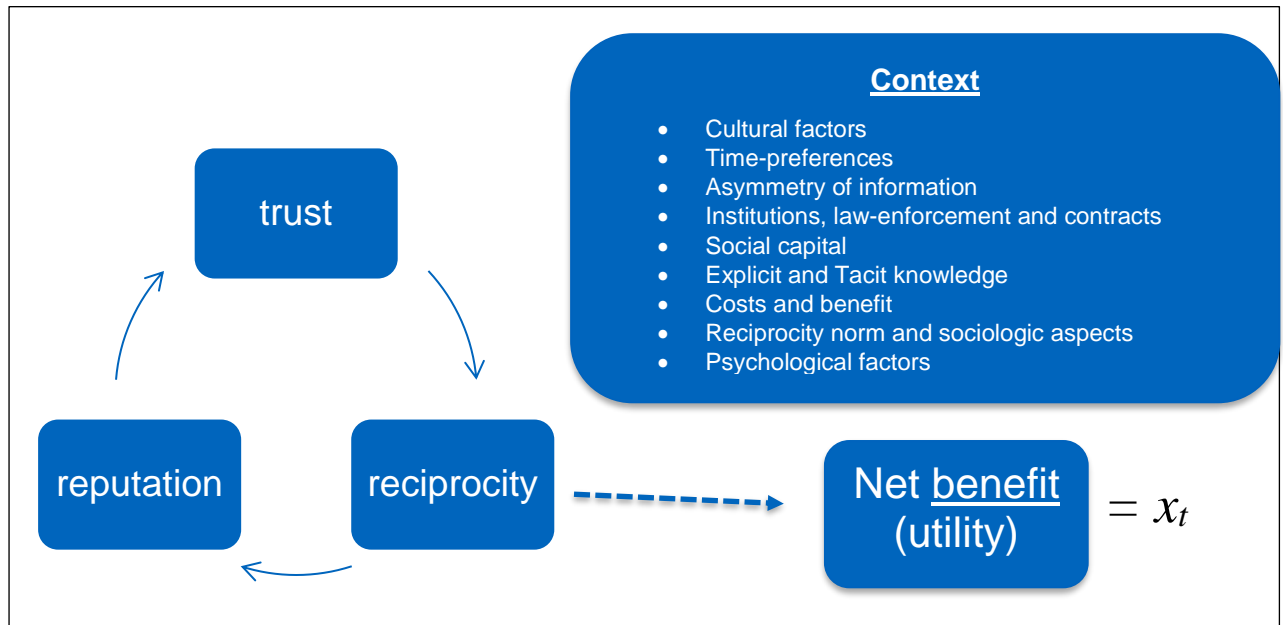


Figure 14: Trust process of the Framework A adapted from Mui et al. (2002).

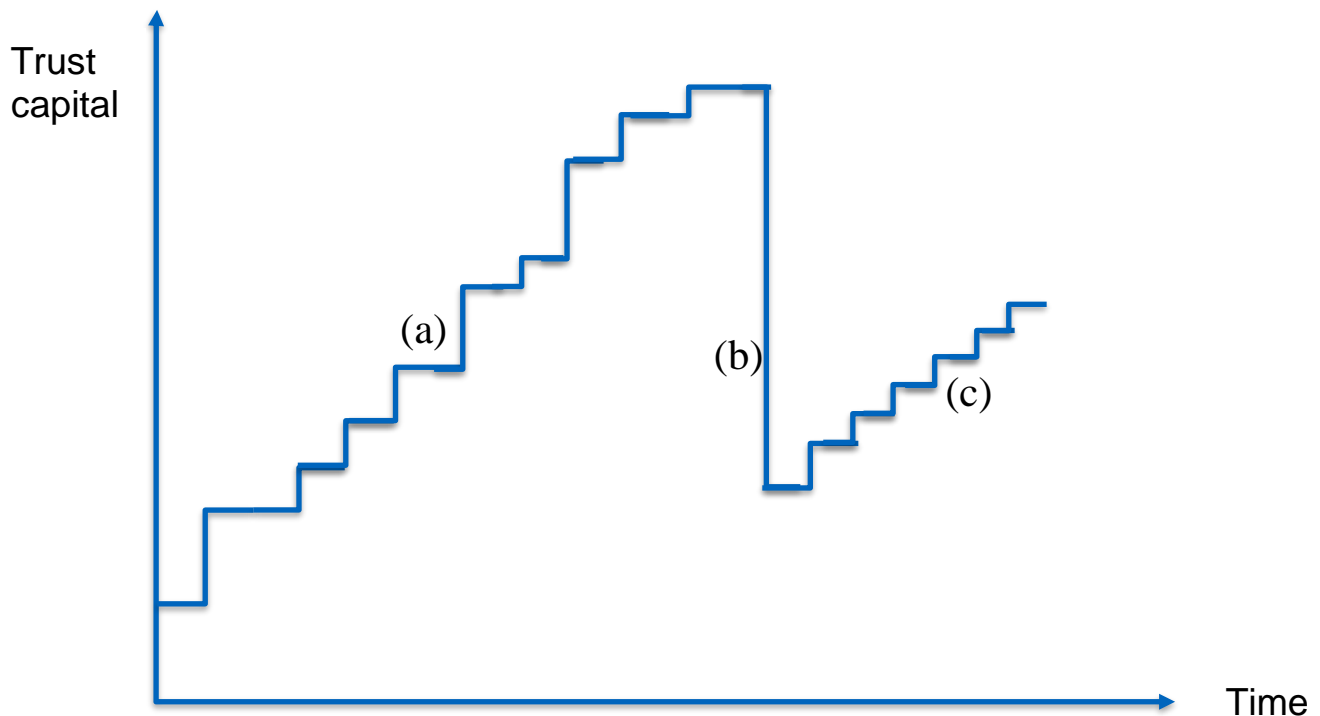


Figure 15: An example on how Trust is generated in the Framework A by time and interactions.

### 3.2.1 Discounted utility – Framework A

According to the modern economics, most human beings tend to maximize their ‘utility’ or wellbeing with their actions. It should be however noted that people do not represent the ‘*homo economicus*’ species, but when we study trust with certain mathematical models, more or less rational behavior is witnessed by the cognitive actors. “*Humans tend to be boundedly-rational*” (Yu 2015).

As people tend to act in temporal context, they value the present moment on the expense of current moment, i.e. the model assumes most people have a positive time-preference: a 100-dollar note is more valuable for the individual now than after three years (e.g. Zhang & Rashad 2008). Based on these theoretical assumptions I will expand the Framework A on *boundedly-rational calculation* and *time-discounted utility model*. This model does not tell the whole truth about human reasoning in the context of trust but describes it well enough to form certain implications of trust building.

The model is based on repeated games in a temporal context where actor’s X and Y act together either reciprocally or deceptively. The outcomes of this game are based on several factors: the strategy of players, the net value of each choice for the players, their time-preference (i.e. personal discount factors) (see Section 2.1.6) and how altruistic they are, i.e. willing to adapt others interests partially as their own. The utility for the player  $x$  is determined by the following equation:

$$Utility(X) = \sum_{t=1}^T \frac{x_t}{(1+d)^t} = \frac{x_1}{(1+d)^1} + \frac{x_2}{(1+d)^2} + \frac{x_3}{(1+d)^3} \dots \frac{x_t}{(1+d)^T}$$

The constant  $d$  refers to the individual’s own time-preference, which describes how much the actor X favors the present moment at the expense of future income. (In this illustration the discount factor is assumed to be constant over time, though the reality might be more complex.) A high time-preference is typical for example drug addicts and highly correlated with impulsiveness (Kirby & Bickel 1999). It would be rational to assume that higher time-preference would correlate with a strategy of lesser trusting as high short-term profits might overwhelm the individual’s long-term losses as he or she appreciates the present very highly on the expense of future utility gains.

### 3.2.2 Game theoretical outcomes – Framework A

The result of every game  $x_t$  in Framework A is determined as follows. The participants play consecutive games where the outcome is one of the four: mutual cooperation or deception or a mixed game where either player X or Y play cooperation and the other deceits.

Table 5: Prisoner's dilemma game, Framework A.

$x_t =$	Game of trust (Prisoner's Dilemma)	Co-operate (Y)	Deceive (Y)
	Co-operate (X)	C ; C	B ; A
	Deceive (X)	A ; B	D ; D

The Nash equilibrium is always mutual deception in a short-term game IF  $A > C > D > B$ . So the utility outcome in a short-term, self-interested game for both is always (D ; D). This result implies that no matter what the other participant chooses to do; the optimal strategy for X is always to deceive. As in this example, the outcomes for player X is **bolded**. Deceiving is the dominant strategy of both, and thus mutual deception is always favored (colored yellow).

Table 6: Prisoner's dilemma, an example.

$x_t =$	Prisoner's Dilemma (Utility from years of imprisonment)	Co-operate (Y)	Deceive (Y)
	Co-operate (X)	<b>-2</b> ; -2	<b>-7</b> ; 0
	Deceive (X)	<b>0</b> ; -7	<b>-3 ; -3</b>

The real world does not work as simplistically as this example demonstrates, but the idea is to get a grasp of the **dynamics of trust**. There are plenty of factors which affect the phenomena not included in this illustration such as the asymmetrical information, probabilities, and uncertainty, more than two options to select from, the possibility of trust games where Nash equilibrium or dominant strategies are something other than mutual deception. The world is also more complex in terms of the human cognition and psychology than this model based on rational calculus. However, this framework of trust building will give an idea about some of the factors affecting the process.

### 3.2.3 Effect of time preference – Framework A

As we compare different strategies in a temporal context, the model works quite differently and favors different outcomes. (We continue the example with the prisoner's dilemma game demonstrated in the previous section.) Let's take a temporal game with four intervals. The counterparty, player Y is assumed to be cooperative as default, but to respond to deception with distrust. If we compare two different strategies where the first one, strategy A, is about cooperation and the strategy B is taking use of Y's trust in  $t=1$ , leading to distrust of parties, the utility discounting goes as follows. We assume that Y does not have the information about X's time-preference or any other reputational data.

$$Utility(X) = \sum_{t=1}^4 \frac{x_t}{(1+d)^t} = \frac{x_1}{(1+d)^1} + \frac{x_2}{(1+d)^2} + \frac{x_3}{(1+d)^3} + \frac{x_4}{(1+d)^4}$$

From the perspective of X, the utility stream gained from strategy A is therefore (-2, -2, -2, -2) and strategy B (0, -3, -3, -3). Therefore, strategies A and B yield a discounted utility as follows:

$$UtilityA(X) = \sum_{t=1}^4 \frac{x_t}{(1+d)^t} = \frac{-2}{(1+d)^1} + \frac{-2}{(1+d)^2} + \frac{-2}{(1+d)^3} + \frac{-2}{(1+d)^4}$$

$$UtilityB(X) = \sum_{t=1}^4 \frac{x_t}{(1+d)^t} = \frac{0}{(1+d)^1} + \frac{-3}{(1+d)^2} + \frac{-3}{(1+d)^3} + \frac{-3}{(1+d)^4}$$

If the time-preference of the individual X is, say **d=0,15**, the utility gained from the multi-period model goes as follows:

**Strategy A: - 5,71 and Strategy B: - 5,96**

When a temporal setting is applied, the individuals gain higher utility by co-operating. Suddenly the Nash equilibrium of the one period game does not apply as the utility maximizing strategy of the individual, even from the rational calculus based perspective. However, when the time-preference is higher, say **d=0,25**, the numbers turn other way around, deception is encouraged:

**Strategy A: - 4,72 and Strategy B: - 4,68**

Based on the analysis of this simplistic and theoretical Framework A three implications should be noticed concerning the building of trust:

- 1) The time-preference of the individuals can make a huge difference whether actors tend to trust each other or not. A higher time-preference is therefore associated with a less trusting behavior as demonstrated.
- 2) The number of intervals in a trust relationship between the same actors, X and Y, is associated with even higher relative advantage for the trusting strategy (A) compared to taking advantage of the other actor's misplaced trust in  $t=1$  (B), regardless the individuals time-preference. (The longer the relationship is, the more beneficial it is to trust.)
- 3) If the one, X or Y who deceives the another individual, manages to keep up the façade for a longer period, through cheating and information asymmetries, the benefits of the scam are the greater, the longer the play goes on. This observation explains, for example, the incentives of a Ponzi-scam – short terms huge profits at the expense of trust are the higher, the longer the scam goes on, as well the higher time-preference the cheater has.

Therefore, the following hypotheses are formed:

**Hypothesis 11 (H11):** *“A higher time preference is associated with a lower amount of trusting behavior.”*

**Hypothesis 12 (H12):** *“A longer commitment in a supply chain partnership is associated with a higher degree of trust.”*

### 3.3 Hypotheses

Based on the literature review and the Framework A built on it, several hypotheses have been formed and will be tested in the empirical part. These hypotheses are tested with an empirical study and analysis conducted as a questionnaire to the members of the association of logistics experts in Finland (Suomen Ostoj ja Logistiikkayhdistys LOGY ry). Other contacts, which the respondent group consists of, was acquired from the database of the customer data company called Suomen Asiakastieto Oy and their lists of the logistics and purchasing experts of Finland.

The hypotheses of this thesis are listed as follows:

1. Hypothesis 1 (H1): “Trust and the seamlessness of human collaboration are more important factors for the success in supply chains than the use of technology”
2. Hypothesis 2 (H2): “The role of technology as a superior factor of supply chains is often exaggerated.”
3. Hypothesis 3 (H3): “Trust can be seen as capital, i.e. ‘trust capital’.”
4. Hypothesis 4 (H4): “Trust is the most important prerequisite for successful supply chain management.”
5. Hypothesis 5 (H5): “Sharing information among supply chain partners increases the level of trust in the supply chain.”
6. Hypothesis 6 (H6): “Finding the right ways of cooperation in supply chain that works, takes time and is an iterative process of trial and error by its nature.”
7. Hypothesis 7 (H7): “Knowledge-based view on trust explains better the phenomenon of trust in supply chain context than calculus-based trust.”
8. Hypothesis 8 (H8): “Collecting and exploiting tacit knowledge in the supply chain is one of the most important factors that enables a competitive advantage for the supply chain.”
9. Hypothesis 9 (H9): “The production and using of tacit knowledge in the supply chain partnership is related with high level of trust in the supply chain collaboration.”
10. Hypothesis 10 (H10): “Rebuilding trust is harder after it is considered to be lost once.”
11. Hypothesis 11 (H11): “A higher time preference is associated with a lower amount of trusting behavior.”
12. Hypothesis 12 (H12): “A longer commitment in a supply chain partnership is associated with a higher degree of trust.”

## 4 Empirical analysis

The empirical part of this master's thesis work consists of a questionnaire that collects relevant data to test out the hypotheses is built on the introduction section, literature review, and the theoretical framework. This questionnaire was sent to the logistics experts with the title of "Supply chain collaboration survey" (*Supply chain collaboration tutkimus*) through email (see section 4.2).

### 4.1 Sampling pool

The questionnaire of this thesis was delivered to the respondents in cooperation with the logistics expert's Association of Finland (Logy ry.), through their monthly membership email letter. Additional contacts were collected to the sampling pool by using the database of a customer information company Suomen Asiakastieto, which has an extensive database of logistics experts as well as purchasing managers of Finnish enterprises of all sizes. This service was used due to the low amount of responses received from Logy ry membership email list.

The sampling pool of Logy ry consisted of a total of approximately 4 000 logistics experts all around Finland. An additional 6117 contacts were included in the pool from the database of Suomen Asiakastieto Oy. Their large contact database was narrowed with a contact tool, which the company offers to its customers. All-size Finnish companies were included in the sampling pool. The targeted people were *the experts responsible for logistics operations or purchasing* in the individual companies.

As a result, only five responses were obtained from the Logy ry pool resulting only in a little over 0,1% respondent rate. The reason might be that many people are ignorant about monthly membership emails. The questionnaire was located in the latter part of the letter so that this might have decreased the respondent rate as well. However, the respondent rate from the database of Suomen Asiakastieto delivered more results for this study. Out of 6117 contacts delivered by Asiakastieto, 215 (3,5%) answers were received. The total amount of well over 200 replies in this questionnaire is supposed to enable this study to get statistically significant results (Suh & Kwon 2006). All in all, **a total of n=220 answer were received.**

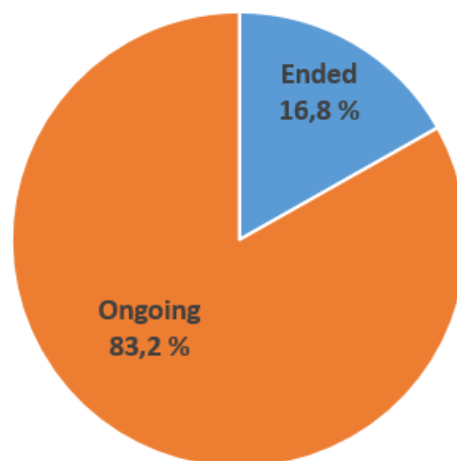
The questionnaire form conducted with Google Form (Appendix A) was sent through email to the experts of the companies. They were motivated by a movie ticket lottery and that they would eventually gain too access to the summary of results of the data collected via this

form. In the case of Asiakastieto's contacts, the request to answer this questionnaire was sent by email through the thesis author's Aalto University student email and contacts were added to 'BBC:' -field of the email. This practice resulted that some of the respondent company email systems could have automatically categorized this email request as a spam mail. Some mail delivery systems informed straightly if they had blocked the mail. Some of the email addresses were old, in the sense that they were not functioning anymore. A few respondents might have also missed the request email due to sick leave, holiday, etc. Some of those replied with automatic email responses.

#### 4.1.1 The respondent data

The interviewees (n=220) were asked more specific questions about their supply chain partnership in section B where they provided background information about their supply chain partnership. Out of these business partnerships, 83,2% (183) were still ongoing, while 16,8% (37) supply chain partnerships had ended from the viewpoint of the respondent.

**Status of the relationship**



*Figure 16: Status of the relationship from the viewpoint of the individual respondent (n=220).*

#### 4.1.2 The sizes of the respondent companies and their partners

In these supply chain partnerships, the respondent's companies varied a lot by size. A total of eight respondents (8) were not willing to reveal the size of their company while three (3) answers were not given. This part of the questionnaire was optional to answer due to some businesses having privacy concerns about their strategic alliances. Therefore, a total of 209



answers (95,0%) were given where the respondents' firm size in terms of turnover was possible to determine.

They were distributed as follows:

*Table 7: The size distribution of the respondent's firms, n=209.*

Category	Turnover / year (€)	# of respondents	Percentage
Micro-companies	0 - 2 million	29	13,9 %
Small companies	2 - 10 million	76	36,4 %
Middle-size companies	10 - 50 million	51	24,4 %
Large companies	50 – 500 million	41	19,6 %
Very large companies	Over 500 million	12	5,7 %

The companies, which the respondents collaborated with, were on average bigger in size than the respondent companies themselves. Most likely due to privacy reasons three left unanswered to this section and 25 respondents were not willing to specify the turnover category of their partner. However, 192 answers about the supply chain respondent's partner company were acquired, and they distributed as follows:

*Table 8: The size distribution of the selected SC partner companies, n=192.*

Category	Turnover / year (€)	# of respondents	Percentage
Micro-companies	0 - 2 million	22	11,5 %
Small companies	2 - 10 million	49	25,5 %
Middle-size companies	10 - 50 million	54	28,1 %
Large companies	50 – 500 million	46	24,0 %
Very large companies	Over 500 million	21	10,9 %

#### 4.1.3 Internationality

As the questionnaire was written in Finnish and sent to the representatives of Finnish companies, it was suspected that most of these companies work in the Finnish markets with their supply chain partner, but the study shows not all of them. A total of 220 answers were collected through this section, meaning every respondent provided the detail of markets where the supply chain companionship in section B happened, though they had the option not to

answer this part. The respondent could choose multiple options. The distribution goes as follows:

*Table 9: The geographical summary of the markets where the respondent and partner firms operate / operated as the respondent described, n=220.*

Market area	# of respondents	Percentage
Finland	196	89,1 %
Other Nordics	51	23,2 %
Western and Central Europe	51	23,2 %
Eastern Europe	28	12,7 %
Southern Europe	21	9,5 %
Africa	4	1,8 %
Middle East	7	3,2 %
Russia	12	5,5 %
North America	11	5,0 %
Central and South America	4	1,8 %
Australia and Oceania	7	3,2 %
Japan	4	1,8 %
Far East (China, India etc.)	18	8,2 %

#### 4.1.4 Industries of respondent companies and their partners

Additionally, to the internationality status of the companionship and the sizes of the companies, **the industries of the cooperating companies** were also asked from the respondents. The survey form used the official Standard Industrial Classification 2008 of the Finnish authorities (TOL2008; *Toimialaluokitus 2008*). The data collected shows nearly half of the respondent companies chose to describe their partnership with a logistics company as 43,9% of the interviewees described their companionship with a firm working in the industry *H – Transportation and storage* according to the TOL 2008 classification. The biggest single group of the respondents (40,0 %) were operating in the *C – Manufacturing* industry. The answers to the background question of industries are listed below:

	Respondent n=195	%	Partner n=180	%
A Agriculture, forestry and fishing (01-03)	5	2,6 %	2	1,1 %
B Mining and quarrying (05-09)	1	0,5 %	1	0,6 %
C Manufacturing (10-33)	<b>78</b>	<b>40,0 %</b>	<b>48</b>	<b>26,7 %</b>
D Electricity, gas, steam and air conditioning supply (34-35)	1	0,5 %	5	2,8 %
E Water supply; sewerage, waste management and remediation activities (36-39)	6	3,1 %	4	2,2 %
F Construction (41-43)	16	8,2 %	12	6,7 %
G Wholesale and retail trade; repair of motor vehicles and motorcycles (45-47)	<b>32</b>	<b>16,4 %</b>	15	8,3 %
H Transportation and storage (49-53)	<b>37</b>	<b>19,0 %</b>	<b>79</b>	<b>43,9 %</b>
I Accommodation and food service activities (55-56)	2	1,0 %	2	1,1 %
J Information and communication (58-63)	2	1,0 %	2	1,1 %
K Financial and insurance activities (64-66)	1	0,5 %	0	0,0 %
L Real estate activities (67-68)	2	1,0 %	0	0,0 %
M Professional, scientific and technical activities (69-75)	0	0,0 %	0	0,0 %
N Administrative and support service activities (77-82)	0	0,0 %	0	0,0 %
O Public administration and defence; compulsory social security (83-84)	0	0,0 %	0	0,0 %
P Education (85)	0	0,0 %	0	0,0 %
Q Human health and social work activities (86-88)	2	1,0 %	4	2,2 %
R Arts, entertainment and recreation (90-93)	0	0,0 %	0	0,0 %
S Other service activities (94-96)	6	3,1 %	2	1,1 %
T Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use (97-98)	0	0,0 %	0	0,0 %
U Activities of extraterritorial organisations and bodies (99)	1	0,5 %	0	0,0 %
X Industry unknown 0	3	1,5 %	3	1,7 %

Table 10: The industries of respondents and their partners according to TOL2008.

## 4.2 Questionnaire

The questionnaire (Appendix A), which was sent to the logistics experts all around Finland, consists of two sections, A and B. The first part, A, represents eight propositions about supply chains (or supply chain management) in general. One additional question was asked where the respondent *ranked* certain aspects (8 items), based on how important they are for “*a successful supply chain management.*”

The answer to the first 8 general questions was given with a 7-option Likert-scale where the respondent could choose whether he or she totally agrees or disagrees with the proposition, or whether the opinion is somewhere in between of these two extremes. The one additional question asks the respondent to **rank** eight items (from the most important to the least important) based on their importance for successful SCM.

Section B focuses on representing 16 propositions of **a specific supply chain companionship with a certain firm which the respondents are asked to recall to his mind.** In this way it is meaningful to study which aspects of supply chain collaboration explains the existence or emergence of trust the most. The answers of section B were also collected with a 7-option Likert-scale, except question number one, which is about trust in supply chains. In this question, a nine-option (9) scale was used as it can capture more detailed nuances of the answer compared to 7-option scale, as the priority of this study is to study especially trust. Suh and Kwon (2006) uses a similar model. This setting is ideal for performing an OLS regression analysis to study whether certain traits of supply chain collaboration have statistically significant effect on the variable (trust), that is wanted to be explained by this thesis (A similar to the model of Suh & Kwon 2006).

It should be noted that there is some debate whether using Likert-scale with linear regression is appropriate (Jamieson 2004). However, according to an extensive study by Carifio & Perla (2007), it is a myth that only non-parametric statistical tests should be applied to Likert scales as the response formats are interval scales. A seven-item Likert-scale is thus interpreted here to be ‘continuous enough’ to meet the criteria for conducting an OLS regression (Grace-Martin 2008).

All propositions of the questionnaire were compulsory to the respondents to answer and therefore all propositions in section A and B have the same respondent number of n=220 (contrary to the background information section).

#### 4.2.1 Testing, redesigning and feedback of the survey form

The functioning of the questionnaire form and the understandability of the questions were tested before the launch of the inquiry with some logistics experts as well as with some non-academic people to make sure the forms are understandable. They gave some initial dummy answers to ensure the functioning of the form and the database system (Google Drive), which records the entries. These test entries were later deleted from the answer database.

In the testing phase, some questions were redesigned, and the layout was altered a bit to make the answering easier and unambiguous for the respondent. Through testing, feedback, and little altering, the survey was considered good enough by the author and the supervisor of this thesis to be sent to the respondents. Some control variable questions were also added to the questionnaire, section B.

#### 4.2.2 List of Propositions

As the questionnaire consists of two sections A and B, the propositions are named after their sections A or B. The part A is about supply chain management in general, while the section B studies a certain and specific supply chain partnership, which the respondent is asked to recall to his or her mind. The corresponding hypotheses of each proposition are in parenthesis.

##### 4.2.2.1 Section A

- A1. Well-defined contracts and incentive systems are more important than building deep trust in supply chains (H7).
- A2. Trust and the seamlessness of human collaboration are more important factors for the success in supply chains than the use of technology. (H1)
- A3. It is essential to get benefits straight away in an early stage in a supply chain collaboration (H11).
- A4. Trust with supply chain partner that will lead to cost benefits develops rather slowly than quickly. (H3 & H12)
- A5. Rebuilding trust is harder after it is considered to be lost once. (H3, H7 & H10)
- A6. Collecting and exploiting tacit knowledge in the supply chain is one of the most important factors that enables a competitive advantage for the supply chain. (H8)
- A7. The role of technology as a superior factor of supply chains is often exaggerated. (H2)
- A8. Finding the right ways of cooperation in supply chains that works, takes time and is an iterative process of trial and error by its nature. (H6 & H3)

A9. Rank the following items based on their importance in successful supply chain management: (from most important to least important)

- 9.1. The use of newest technology in supply chain
- 9.2. Trustfulness of the supply chain partners (H4)
- 9.3. Commitment of the supply chain partners
- 9.4. Well defined contracting with the supply chain partners
- 9.5. Effective sharing of knowledge in the supply chain
- 9.6. Good reputation of the partners in supply chain
- 9.7. Predictability and low-riskiness of the partners in supply chain
- 9.8. Performance and flexibility of the partners in supply chain

#### **4.2.2.2 Section B**

- B1. The level of trust was excellent in the supply chain partnership that I recalled.
- B2. Information sharing was deep and extensive in this partnership. (H5)
- B3. In this partnership that I recalled the use of newest technologies in corporate planning systems was extensive.
- B4. The partnership that I recalled has lasted for a long time already. (H3, H7 & H12)
- B5. The partner that I recalled has or had good reputation in the markets. (H3)
- B6. Our supply chain was/is able to exploit the tacit knowledge that in the chain. (H7 & H9)
- B7. In the partnership that I recalled, contracting framework is clear and extensive for example in terms of risk management. (H7, negative relationship)
- B8. We have made a lot of assets specific investments in our partner company.
- B9. The partner company has made a lot of asset specific investments in our company. (H7, negative)
- B10. The partnership I recalled worked very efficiently and seamlessly.
- B11. This supply chain partnership benefited/benefits our company very much.
- B12. This supply chain partnership benefited/benefits the partner's company very much.
- B13. We are focusing more on short-term gains rather than long-term benefits in this companionship. (H11)
- B14. The integration between companies in this supply chain I recalled was very deep.
- B15. We are/were ready to sacrifice our own interest and being flexible for the partner company.
- B16. The partner company was ready to sacrifice and being flexible for the interests of our company.

## 4.3 Results

The results for the hypotheses and the propositions corresponding to them are listed below in this section 4.3. This section goes first through the Hypotheses related to section A and then the model built on answers of section B is established in section 4.4.

### 4.3.1 Hypothesis 1 – Technology vs. trust

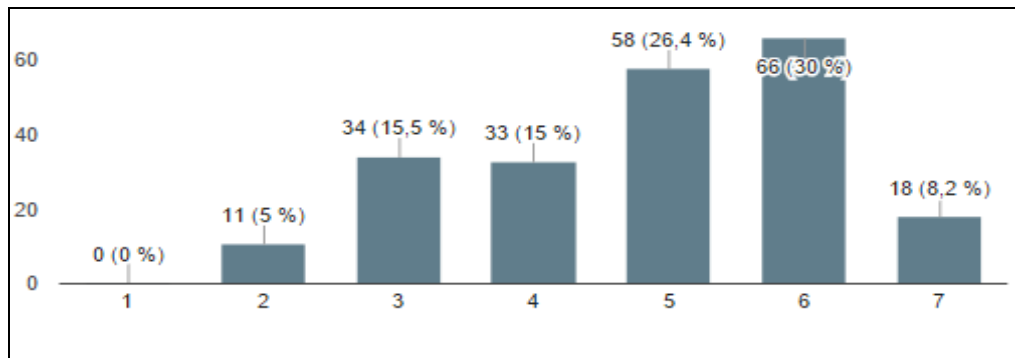
Proposition 2 (A2) in section A studies the hypothesis 1 (H1). The hypothesis suggests: *“Trust and the seamlessness of human collaboration are more important factors for the success in supply chains than the use of technology”*. This hypothesis was tested through a Likert-scale proposition where the respondent answers whether they totally agree or disagree with this proposition or whether their views are somewhere in between the extremes.

Allen and Seaman (2007) argues that *“mean and standard deviations are in general invalid parameters for descriptive statistics”*. A better way to study descriptive statistics are *“tabulations, frequencies, contingency tables and chi-square tests”*.

Therefore, the propositions are studied as polling survey data, and the margin of error is used as the method to determine whether the propositions get statistical support or not. The hypotheses are interpreted to be strongly supported if over half of the respondents agree more than disagree with the proposition, even when we take account the lower end of the margin of error. The answers for A2 related to the first hypothesis (H1) are distributed as follows (n=220):

Table 11: Answer distribution to the proposition 2 (A2).

SCALE ->	totally disagree			in between		totally agree	
	1	2	3	4	5	6	7
ANSWERS ->	0	11	34	33	58	66	18
%	0,0 %	5,0 %	15,5 %	15,0 %	26,4 %	30,0 %	8,2 %
	Disagree more than agree			Between	Agree more than disagree		
	20,5 %			15,0 %	64,5 %		



The margin of error for surveys are calculated through the following formula for a confidence level of 95% (VirtuaaliAMK-verkosto):

$$\pm 1.96 * \sqrt{\frac{p * (1 - p)}{n}}$$

The variable ‘ $p$ ’ refers to the observed amount of answers, i.e., ‘*sample probability*’ and ‘ $n$ ’ to the amount of total responses given). Therefore, we can estimate with a 95% confidence level, the right percentage that agrees with the A2 (supporting H1) is between  $64,5\% \pm 6,3\%$ . The null hypothesis that ‘under half of the population agrees with A2 more than disagrees’ is rejected. Therefore, the **Hypothesis 1 (H1) is supported** as over half of the population agrees more than disagrees or is neutral with the proposition 2 with a confidence level of over 95%:

H1: “*Trust and the seamlessness of human collaboration are more important factors for the success in supply chains than the use of technology.*” is strongly supported.

#### 4.3.2 Hypothesis 2 – Technology as an exaggerated factor

The Hypothesis 2 (H2) goes as follows: “The role of technology as a superior factor of supply chains is often exaggerated.” This was also studied in section A of the questionnaire with the same methodology, by asking the respondents to answer whether they totally agree or disagree with the proposition or are in-between. This hypothesis was tested through Proposition 7 (A7) and analyzed by similar methodology as with the Hypothesis 1.



The distribution of answers to A7 goes as follows:

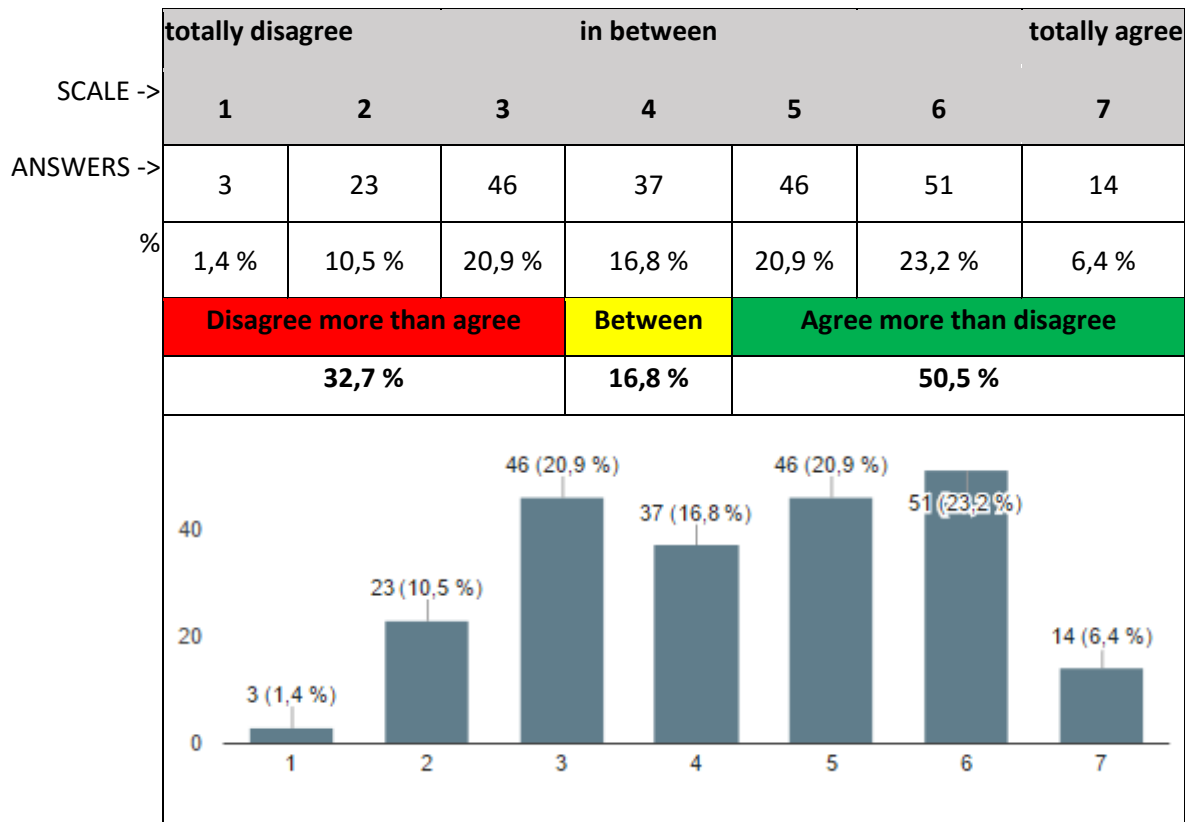


Table 12: Distribution of answers to Proposition 7 (A7).

With a 95% confidence level the A7(agree) is  $50,5\% \pm 6,6\%$ . Therefore, we cannot reject the null hypothesis that under half of the population with a 95% confidence level agrees more than disagree or are in between with the proposition. However, we can gain a moderate amount of support for the Hypothesis 2 as we can reject another (weaker) null hypothesis with a high confidence level, which goes as follows: “equal amount or less amount of population agrees more than disagrees with the proposition 7.”

Therefore, we can conclude that the proposition 7 (A7) and thus Hypothesis 2 (H2) is moderately supported as the population agrees more than disagrees with it with a high confidence level. The distribution of answers is clearly statistically distributed towards the side of “agree more than disagree” and over 83% of the respondents had an opinion of the matter other than “in between” (4 on the Likert-scale). H2 is not however supported as clearly as the H1.

Hypothesis 2 (H2): “*The role of technology as a superior factor of supply chains is often exaggerated.*” is moderately supported.

#### 4.3.3 Hypothesis 4 – Trust as the most important SCM success-factor

Hypothesis 4 (H4) goes as follows: *“Trust is the most important prerequisite for successful supply chain management.”* The hypothesis was tested in the last question (A9) of section A, where the respondent ranked eight different items in the order of their importance on successful supply chain management. These items were selected for the questionnaire based on the literature review in Section 2 of this thesis:

1. The use of newest technology in supply chain
2. Trustfulness of the supply chain partners
3. Commitment of the supply chain partners
4. Well defined contracting with the supply chain partners
5. Effective sharing of knowledge in the supply chain
6. Good reputation of the partners in supply chain
7. Predictability and low-riskiness of the partners in supply chain
8. Performance and flexibility of the partners in supply chain

The hypothesis is tested through a statistical test whether the hypothesis is supported or not. The methodology of this section was again a survey where Hypothesis 4 was tested whether it gains support or not with a significance level of 95% (See Table 13).

The item 2, “trust”, gained the most popularity with a total of 43,2% (95 respondents) of the interviewees mentioning it to be the most important factor for successful supply chain management. The margin of error is therefore with a  $n=220$ ,  $\pm 6,5\%$ . As the second most important item; “commitment” gained a total of 23,6% (58 respondents) it is safe to say trust is the most important item for successful supply chain management with a confidence of over 95%.

It should also be noted that as commitment is the second most important item, it is highly related to trust according to the literature review and various theories of trust. Therefore, as commitment was ranked so high, it can be interpreted to support the hypothesis as trust and commitment are highly related to each other.

The distribution of answers was the following:

ITEM (n=220)	Most important	2nd	3rd	4th	5th	6th	7th	Least important
Technology	5.5%	3.6%	8.6%	5.0%	10.9%	12.7%	15.0%	<b>38.6%</b>
Trust	<b>43.2%</b>	<b>24.5%</b>	11.8%	6.8%	4.5%	2.3%	4.1%	2.7%
Commitment	<b>23.6%</b>	<b>30.9%</b>	19.5%	9.5%	5.9%	4.5%	3.6%	2.3%
Contracting	5.5%	6.4%	14.5%	19.1%	13.6%	15.5%	17.7%	7.7%
Sharing of knowledge	5.9%	9.1%	18.6%	20.9%	15.9%	18.6%	8.6%	2.3%
Reputation	0.9%	4.5%	4.1%	8.2%	16.8%	19.5%	17.7%	28.2%
Predictability & Low risk	3.2%	5.0%	10.0%	13.2%	15.0%	17.3%	25.0%	11.4%
Performance & Flexibility	12.3%	15.9%	12.7%	16.8%	16.8%	9.5%	8.2%	6.8%

Table 13: Most important factors in succesful SCM (A9), n=220.

Therefore, the Hypothesis 4 (H4): “*Trust is the most important prerequisite for successful supply chain management.*” is supported.

#### 4.3.4 Hypothesis 6 – Trust as an iterative process

The Hypothesis 6 (H6) states that: “*Finding the right ways of cooperation in supply chain that works, takes time and is an iterative process of trial and error by its nature.*” This hypothesis was studied in the questionnaire section A with the proposition 8 (A8).

The proposition studies whether trust and the ways of cooperation in supply chains are built in an iterative way, which takes time, or whether right ways can be determined through planning and deductive reasoning.

The answer to this question reflects indirectly whether an evolutionary approach has more explanatory power than a theory based on contracting and planning. This proposition also tests whether efficient supply chain management is about collective learning, which takes time, or not.

The distribution of answers in A8 was the following:

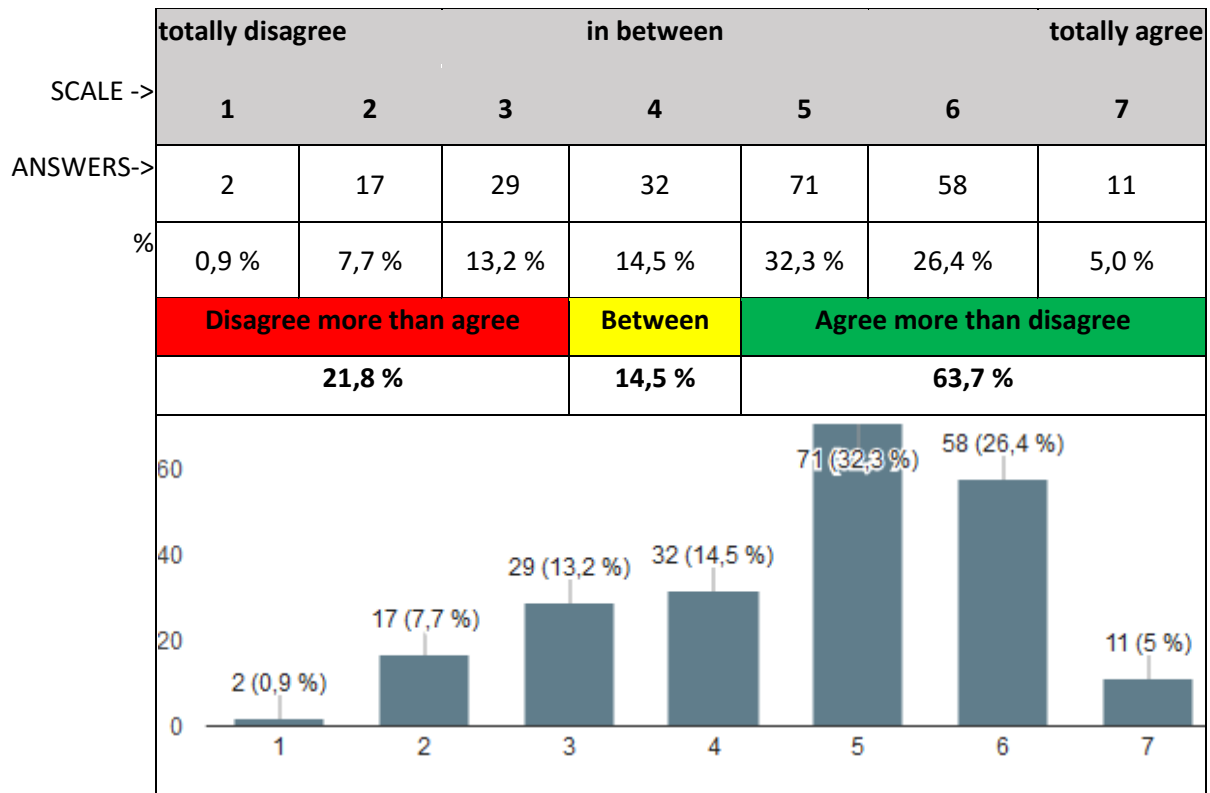


Table 14: Distribution of answers to Proposition 8 (A8).

Applying the margin of error method similar than when studying the Hypothesis 1 (H1), it is relatively easy to determine whether the H6 is supported. The margin of error with 220 respondents is  $\pm 6,4 \%$  with a confidence level of 95%. Therefore, we can reject the null hypothesis that less than half of the population agrees more than disagrees with the proposition 8.

Therefore, the Hypothesis 6 (H6): *“Finding the right ways of cooperation in supply chain that works, takes time and is an iterative process of trial and error by its nature.”* is strongly supported.

#### 4.3.5 Hypothesis 8 – Tacit knowledge and competitive advantage

Hypothesis 8 (H8) studies the role of tacit knowledge as a key factor explaining the competitiveness and performance of supply chains. This was studied with Proposition 6 (A6) in section A in the study as it was highly related to the research questions of this master’s thesis.

The distribution of A6 was the following:

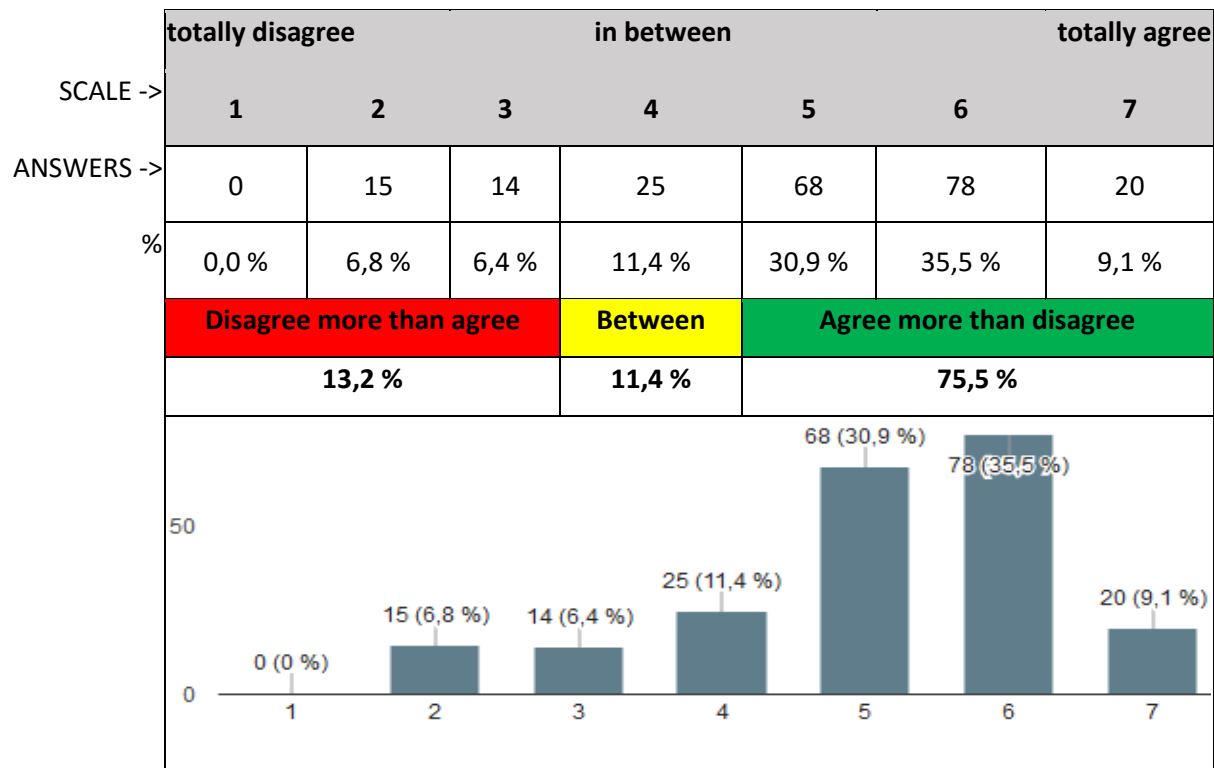


Table 15: Distribution of answers to Proposition 6 (A6).

Given that, over 75,5 % agrees more than disagrees with the proposition, it should be studied whether this majority statistically is significant with the margin of error method. With 220 interviewees the margin of error is  $\pm 5,7\%$ . In this case, we might also reject the null hypothesis that less than half of the respondents agrees more than disagrees with the A6.

Therefore, the Hypothesis 8 (H8): “*Collecting and exploiting tacit knowledge in the supply chain is one of the most important factors that enables a competitive advantage for the supply chain*” is strongly supported.

#### 4.3.6 Hypothesis 10 – Rebuilding trust which has been once lost

The 10<sup>th</sup> Hypothesis of this study (H10) studies the claim whether ‘trust which is once lost is hard to rebuild’. This deals with the theoretical framework and model of this thesis, and thus this fact needs to be verified. The Proposition 5 (A5) studies this hypothesis.

The support for this hypothesis reveal the nature of trust and especially how it is built in a temporal dimension. As trust is considered to be iterative and likely knowledge-based, the role and mechanics of distrust are important. The answer to this question also reveals whether the concept of reciprocity norm receives empirical support or not.

The distribution for A5 was the following:

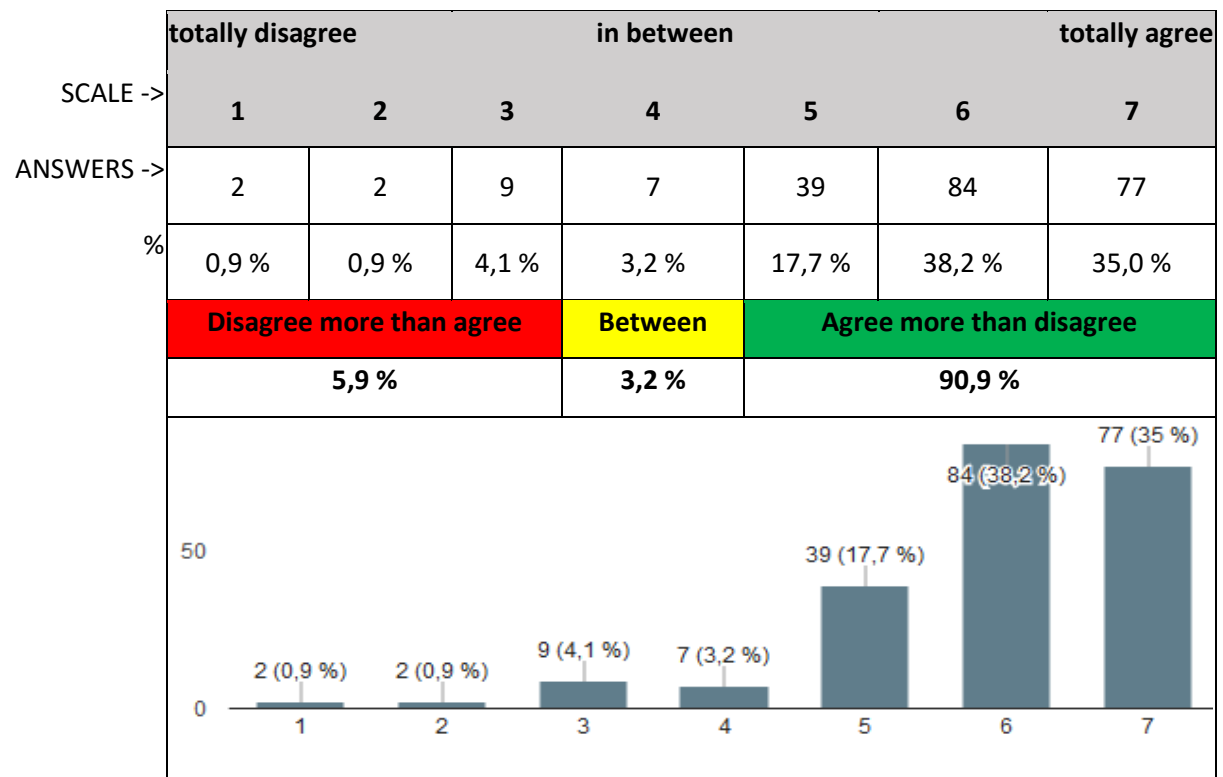


Table 16: Distribution of answers to Proposition 5 (A5).

As we clearly notice, an overwhelming majority agrees more than disagrees with this proposition and thus the existence of reciprocity norm gains more support. More than 9 out of 10 agrees to some degree with Proposition 5 (A5). Therefore, with a confidence level of 95%, more people agree than disagree in the population with the proposition  $90,9\% \pm 3,8\%$ . Rejecting the null hypothesis is safe.

Therefore, the Hypothesis 10 (H10): *“Rebuilding trust is harder after it is considered to be lost once.”* is strongly supported.

## 4.4 Multiple regression model of trust factors

The rest of the hypotheses was studied with the same statistical model acquired through the data of **section B** (and some of the related hypotheses supported with propositions of section A). In this section, the respondents were asked on a Likert-scale from 1 to 7 to answer to certain propositions when it comes to supply chain collaboration **in a particular partnership**. These variables were designed to give an answer on what factors explain trust in supply chains. The statistical significance of certain factors in trust-buildings was studied through a statistical path analysis conducted with the statistics computer software Stata.

The method, which was chosen, consisted of multiple regression analysis with path modeling for determining which variables explains best the phenomenon of trust in supply chains. The variables were selected to the model on the basis of the literature review and the theoretical framework.

Also, variables from the study of Suh and Kwon (2005 & 2006) was introduced as the Hypothesis 7 (H7) studies whether their calculus-based theory of trust gains more support than the knowledge-based model, which this thesis has been covering in the literature review section. The OLS model of this study is also similar to their model.

### 4.4.1 The model

At the initial stage, multiple linear regression models were tested to determine which variables had the most explanatory power when studying the level of trust in Supply Chains (Table 18). The multicollinearity of the variables was investigated through a variance inflation factor (VIF) analysis. As all variables had a VIF below 5, according to O'Brien (2007), the multicollinearity is not indicated. (Pan & Jackson 2008, uses 4 as their maximum allowed VIF value.) In this regression, the highest VIF-value is 2,83 between *Trust (B1)* and *Partnership Efficiency and Seamlessness (B10)*.

The correlations of the variables are tabulated beneath in Table 17. The data demonstrates that while some correlations between variables are high, they still do not exceed a correlation above 0,9, which is considered to be an indicator of possible multicollinearity problem, according to KvantiMOTV guide to statistics by University of Tampere (2003). No multicollinearity issue was therefore detected.

Table 17: Correlation tabulation of Questionnaire, Section B.

Correlation tabulation of Questionnaire B	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B1. Trust	1															
B2. Information sharing	0,76	1														
B3. Newest technology	0,27	0,24	1													
B4. Long duration of partnership	0,4	0,4	0,19	1												
B5. Partner's reputation	0,44	0,39	0,32	0,58	1											
B6. Efficient Use of Tacit Knowledge	0,48	0,49	0,17	0,33	0,31	1										
B7. Well defined contracting & Risk management	0,39	0,36	0,37	0,22	0,34	0,35	1									
B8. Asset specific investments made by focal company	0,09	0,12	0,12	0,08	0	0,14	0,19	1								
B9 Asset specific investments made by partner company	0,22	0,23	0,07	0,06	-0,01	0,28	0,16	0,5	1							
B10. Partnership was Efficient and Seamless	0,7	0,67	0,23	0,51	0,43	0,47	0,36	0,1	0,27	1						
B11. Partnership benefited the Focal company	0,55	0,51	0,23	0,5	0,51	0,44	0,4	0,25	0,28	0,64	1					
B12. Partnership benefited the Partner company	0,38	0,4	0,09	0,4	0,35	0,32	0,35	0,29	0,33	0,47	0,57	1				
B13. Short-term vs. Long-term focus	-0,07	-0,07	-0,04	-0,1	-0,11	-0,06	-0,07	-0,03	-0,07	-0,01	-0,09	-0,1	1			
B14. Integration of processes between focal company and Partner	0,32	0,35	0,45	0,2	0,21	0,28	0,33	0,12	0,2	0,36	0,33	0,3	-0,14	1		
B15. Flexibility and commitment of Focal company	0,32	0,29	0,07	0,15	0,17	0,26	0,19	0,19	0,23	0,32	0,39	0,34	-0,08	0,33	1	
B16. Flexibility and commitment of Partner company	0,46	0,49	0,02	0,31	0,24	0,36	0,17	0,17	0,32	0,57	0,51	0,41	-0,05	0,24	0,53	1

The initial results suggested that there is a total of three different variables that have a statistically significant impact on the level of trust in supply chains when omitted variables were ruled out by various linear regression models with a total of 15 different variables. These variables were: *Information sharing (B2)*, *Partner's reputation (B5)* and *Partnership Efficiency and Seamlessness (B10)*, (Figure 17 & Table 18).

In turn, the variables which explained Information sharing were especially *Efficient use of Tacit Knowledge (B6)* and *Flexibility and Commitment by the Partner company (B16)*. *Partnership Efficiency and Seamlessness of Partnership (B10)* was explained best by the variables *Flexibility and Commitment (B16)*, *Time in Partnership (B4)* and *Benefit for the respondent's company from the partnership (B11)*. *Partner's reputation (B5)* was, in turn, explained statistically best by the variables *Use of Newest Technology (B3)*, *Benefit for the respondent's company (B11)* and *Long time in Partnership (B4)* (Figure 17).



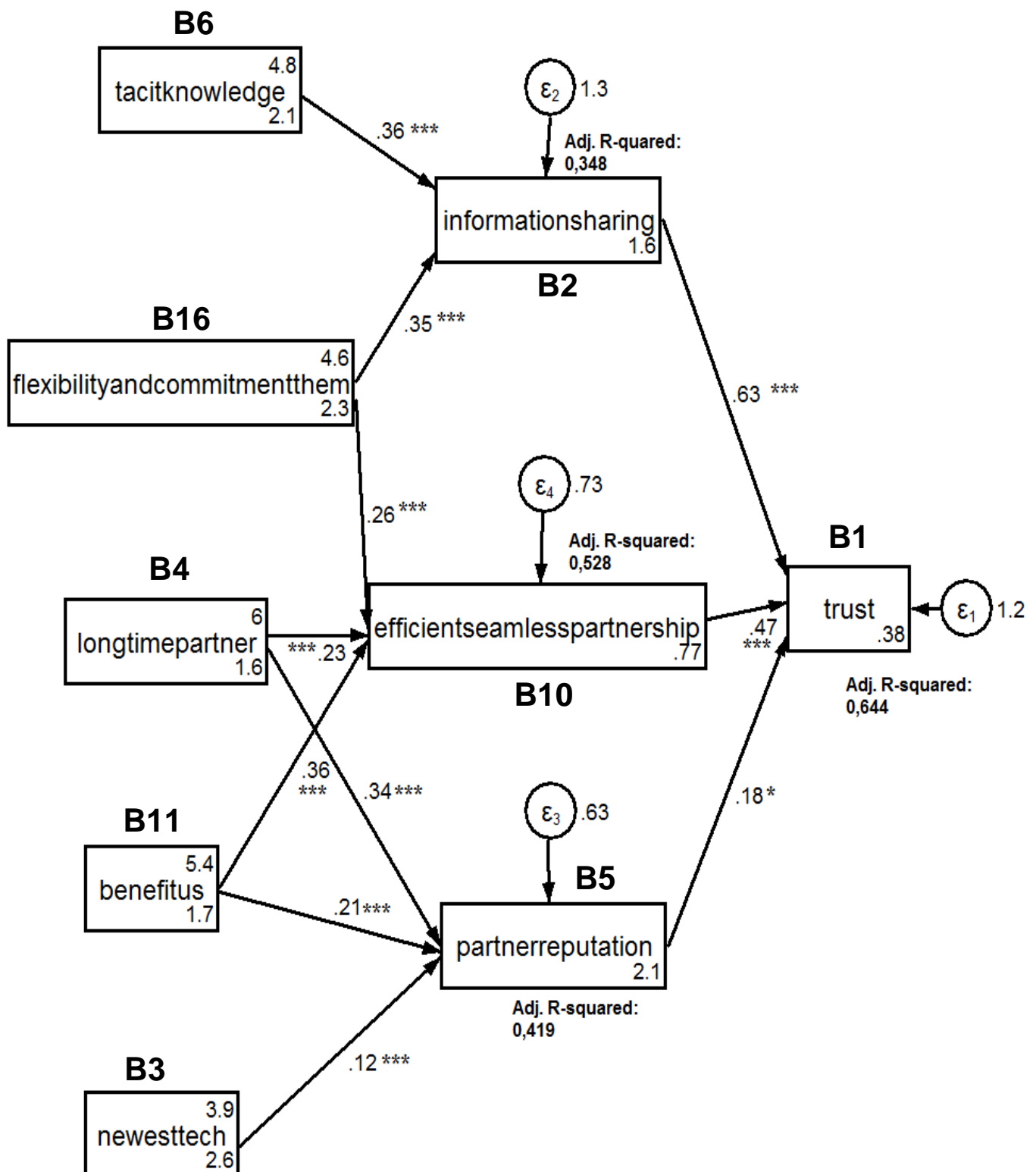


Figure 17: The statistical model,  $n=220$ .

Table 18: Testing different models of trust for explanatory factors & possible omitted-variable bias.

N=220	Trust					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Adjusted R-squared	0,195	0,322	0,336	0,360	0,590	0,598
B4 - Length of the partnership		0,195*	0,344***	0,194*	0,137*	0,0552
B6 - Use of tacit knowledge as a competitive advantage		0,442***	0,348***	0,322***	0,116+	0,0107
B7 - Clear and widely defined contracting	0,378***		0,239**	0,185*	0,131*	0,103+
B8 - Asset specific investments by focal company	-0,0824		-0,0802	-0,068	-0,0527	-0,0462
B9 - Asset specific investments by partner company	0,183*		0,119	0,138+	0,0491	0,0623
B13 - Short-term vs. long-term focus		-0,00851	0,00867	0,0178	0,00403	0,00946
B14 - Integration of processes between the companies	0,235**		0,141+	0,133+	0,0189	0,0173
B2 - Information sharing					0,788***	0,767***
B5 - Reputation of the partner		0,438***		0,367**		0,213*
	+ p < 0,1		** p < 0,01			
	* p < 0,05		*** p < 0,001			

As Table 18 suggests, there are plenty of omitted variables that explain trust. This is not unexpected: it seems logical that the length of partnership and reputation explain each other and correlate – this suggests that they are interrelated. Another finding is that **the variables of calculus-based trust mostly fail to explain trust when they are together in the same model with the knowledge-based variables (Models 3 & 4)**. Model 1 describes the factors related to the calculus-based trust theory; Model 2 outlines the variables of knowledge-based theory. The Models 3 and 4 includes both of them – in this scenario the explanatory power of the calculus-based variables collapse.

In the final model (Model 6), more variables are included in the model. In this case, only *Information sharing* and *Reputation* have still statistical significance. Therefore, they are the most important factors explaining trust. The omitted variables are then studied in the way how well they explain the most significant explanatory variables of trust. This is how the final model (Figure 17) is formed, though modified a bit by adding the variable B10 to get a higher adjusted r-squared value.

The results of this model correspond to the theoretical Framework A by the author (section 3.2, Figure 13) in the theoretical section. Reputation, the perceived benefits, and satisfaction of collaboration are related to each other (*Efficiency and seamlessness*) and explain trust.

#### 4.4.2 Hypothesis 3 & 7 – Trust as capital & Knowledge-based trust vs. calculus-based

Hypothesis 3 deals with the question whether trust can be seen as a capital or not. This hypothesis can be studied and approached with several items of the empirical analysis. First of all, reputation explaining trust, which is built upon a temporal interval from the basis of reciprocity, can be seen to support this hypothesis. The regression model suggests *Partner's reputation (B5)* (a form of trust capital) is associated statistically with the trust in supply chain collaboration with the coefficient of 0,18 and with a p-value lower than 0,05.

In addition to this, and more importantly the parameter *Long-time in supply chain collaboration (B4)* explains both the level of reputation of the partner AND whether the relationship is considered to be *Efficient and Seamless (B10)*, i.e. how it is deemed to satisfy the respondent company. This empirical finding supports moderately the hypothesis 3 (H3) and is in contrary to the evidence of Suh & Kwon's study (2006). The support to proposition A5 (Hypothesis 10) and A8 support also the notion that trust can be seen as a form of capital.

As the theory suggests that knowledge-based trust is highly related to the theory of trust capital, Hypothesis 7 (H7) is studied also in this section as all the findings in this section can also be explained to support the knowledge-based trust theory. The calculus-based theory, which Suh & Kwon (2006) supports in SCM context, does not find a relationship with *time in partnership* and **trust as this study finds**. This is the first important piece of evidence for H7.

In addition to the model (Figure 17), in section A proposition 4 and 8 (A4 & A8) studies whether trust develops quickly or by time. Both of the proposition are agreed by over 50% of the population with a confidence level of over 95%. Therefore, we can clearly show that trust is built in a long temporal context iteratively – rather than created by contracts and acquired of those measures the calculus-based theory on trust suggests (e.g. asset specific investments).

Moreover, the regression model was tested with including the parameters *Assets specific investments (B8 & B9)* and *Clear contracting framework (B7)*. The calculus-based theory suggests that these elements would have a significant explanatory power in terms of trust. However, this relationship was never discovered, even remotely (Figure 17 & Table 18).

This fact supports especially the Hypothesis 7, that the knowledge-based theory explains better trust than the calculus-based theory. The role of tacit knowledge as an indirect building block of trust supports H7 as well, as we have demonstrated earlier that knowledge-based view of trust is highly associated with the use of tacit knowledge. This hypothesis (H7) is supported, whereas the previous Hypothesis 3 is supported only moderately, supposedly due to imperfect questionnaire design from the perspective the of H3.

#### 4.4.3 Hypothesis 5 – Information sharing and trust

The statistical path regression model explains many of the traits, which were described in the literature review and the theoretical framework. The efficient sharing of information (B2) explains with a great significance the forming of trust, as the parameter coefficient is 0,63 and the p-value is less than 0,001. This can be seen as strong support for the Hypothesis 5 (H5), which suggests a strong explanatory role of *Information sharing (B2)* to the variable *Trust (B1)*. In this path regression model, *Information Sharing* is the most significant explanatory variable for trust. The Hypothesis 5 (H5) “*Sharing information among supply chain partners increases the level of trust in the supply chain.*” is strongly supported.

#### 4.4.4 Hypothesis 9 – Tacit knowledge and trust

Hypothesis 9 (H9) states that tacit knowledge is related to the level of trust in supply chain context. As the OLS path model (Figure 17) demonstrates, the use and exploitation of tacit knowledge explain the phenomenon of trust partially: it explains statistically significantly the deepness and extensiveness of information sharing in the supply chain which in turn explains trust significantly. Therefore, we can argue that Hypothesis 9 (H9) is (at least) partially supported as it explains the trust indirectly in a supply chain context according to the model ( $p > 0,001$ ).

#### 4.4.5 Hypothesis 11 – Time-preference and trust

Hypothesis 11 (H11) is the only hypothesis which lacks a good degree of support as the models for trust does not get any significant coefficients nor p-values for the variable *Short-term vs. long-term focus (B13)* in explaining trust. There aren't found any direct nor indirect paths for this. The hypothesis would have got supported if a clear and statistically negative relationship had been discovered with this parameter and *Trust (B1)*. It is assumed this factor, time

preference, in reality, explains to some degree the trust in supply chain context but the question might not have got interpreted perfectly by the respondents and expressed clearly enough by the writer of the thesis. The theoretical framework would suggest a clear *a priori* relationship between time-preference and level of trust and it is believed to be there. This theme, relationship between trust and time-preference of individuals, should be studied therefore more. However, the Hypothesis 11 (H11) is not supported by the empirical data.

#### 4.4.6 Hypothesis 12 – Length of the relationship and trust

Hypothesis 12 (H12) is supported moderately as the duration of the supply chain (B4) companionship explains trust in the supply chain context in two indirect ways: length in supply chain increases statistically significantly the perceived seamlessness (B10) and efficiency in a supply chain AND the reputation of the partner (B5). These factors, in turn, explains well the existence of trust (B1) in a supply chain. The hypothesis is therefore supported moderately as the length of partnership clearly explain (indirectly) the level of trust in a supply chain collaboration according to the path model (Figure 16).

### 4.5 Summary of hypotheses

#	Hypothesis	Supported?
H1	Trust and the seamlessness of human collaboration are more important factors for the success in supply chains than the use of technology	Strongly
H2	The role of technology as a superior factor of supply chains is often exaggerated.	Moderately
H3	Trust can be seen as capital, i.e. ‘trust capital’.	Moderately
H4	Trust is the most important prerequisite for successful supply chain management.	Supported
H5	Sharing information among supply chain partners increases the level of trust in the supply chain	Strongly
H6	Finding the right ways of cooperation in supply chain that works, takes time and is an iterative process of trial and error by its nature.	Strongly
H7	Knowledge-based view on trust explains better the phenomenon of trust in supply chain context than calculus-based trust.	Supported
H8	Collecting and exploiting tacit knowledge in the supply chain is one of the most important factors that enables a competitive advantage for the supply chain.	Strongly
H9	The production and using of tacit knowledge in the supply chain partnership is related with high level of trust in the supply chain collaboration.	Partially
H10	Rebuilding trust is harder after it is considered to be lost once.	Strongly
H11	A higher time preference is associated with a lower amount of trusting behavior.	Not
H12	A longer commitment in a supply chain partnership is associated with a higher degree of trust.	Moderately

Table 19: Summary of the hypotheses.

## 4.6 Discussion

The results have clearly demonstrated that trust is an important part explaining successful supply chain management and that the issue has not been studied enough in supply chain context. Supply chain literature has been dominated by technology, process integration, and other technical aspects rather than understanding the people who collaborate in the chains. This is hopefully changing as the respondents at least in Finland view similarly that the role of technology is exaggerated in supply chain management.

The results of this paper suggest that the human elements of supply chains should be studied more carefully as a significant part of supply chain management is about human psychology. As the model of the study demonstrates, the supply chain management literature should take new steps making the discipline truly polyphonic and to focus on collaboration rather than just the technicalities.

### 4.6.1 Limitations

Although being quite extensive, the study has certain limitations. First of all, the poll of respondents, which was studied, consisted only of Finns as the questionnaire was in Finnish. The awareness of the issues covered could be significantly different in other geographical or cultural areas in the world, influenced by cultural factors, geopolitics, institutions, etc. Therefore, there should be some cautions before generalizing the results to a global context.

Other limitations include the use of Likert scales as the basis of statistical analysis. The debate is partially ongoing in the field whether Likert scales are “continuous enough” for conducting OLS analysis. However, plenty of scientific data show that this is allowed, but should be done by cautions (Grace-Martin 2008). An ordered logit analysis can be done to test and confirm whether it gives similar results than the OLS model (Grace-Martin 2008). In this case, the results were akin to the linear regression models which were used. Other literature reveal it is a myth that Likert scales cannot be used as a basis of parametrical analysis (Carifio & Perla 2007). Some academicians consider that the debate is still ongoing (Grace-Martin 2008).

The third issue is that the setting of the questions and their order of appearance was not randomized, which is usually recommended in these types of questionnaires. This might have affected to the responses. This issue was discovered after conducting the questionnaire and

could not be altered afterward. This could have in theory a small effect on the reliability of the results. It could also be argued that some of the questions were perhaps leading the respondent. This could be the case, though the questionnaire was double checked and verified by the supervisor of this thesis, to avoid unconscious biases.

The fourth issue might be the personal biases and presumptions of the author. This could be the case in as the author has plenty of own views on society and interests to social and political theories of authors such as Hayek and Harisalo. The author could have affected the study by his or her prejudice.

The fifth issue is that the questionnaire format might be too narrow to capture the true nature of several phenomena which were covered. It could be that since the research questions were broad, it might be that some of the separate elements of those should have been studied more closely, in more focused studies. Furthermore, the questionnaire collected subjective evaluations of the respondents (agree or disagree) and was not studying any neutral numerical variables, which could have been answered without any subjective valuation. This subjectivity might limit the extent on how the results can be generalized and might create some form of bias to the data.

## 4.7 Suggestions for future research

As the range of the study is wide and looking at the phenomenon of trust with a holistic perspective, some aspect of the results should be explored more with a narrower and more detailed scope. Also, with separate studies. For example, the relationship and dynamics of tacit knowledge and trust should be explored more in detail. The deep core of trust in supply chains should also be studied with other respondent groups than only with Finnish respondents.

The results where the knowledge-based view on trust is more meaningful perspective compared to calculus-based view needs more evidence because the viewpoints are conflicting. The results of this study need more additional evidence from future research to back its respondent data and results from 220 people.

The mechanics of building trust should also be studied further through qualitative research since the phenomenon is demonstrated in this study to be deeply human. Therefore, the nuances could be examined more descriptively by interviews and by looking more carefully at the human experiences of forming trust. Phenomenology could be applied to this

accordingly. This study has only established its view on literature and quantitative data. The small details and more tacit pieces of knowledge on trust-building might be better caught by interviews and other qualitative research.

The effect of time preference on trust in supply chains, which the author thinks there exists, though not supported by the results, should be studied further. A clear a priori reasoning tells it should exist, but no evidence was found. Perhaps this phenomenon is also more multidimensional and requires the psychological nuances to be taken more carefully into account. Instead of only a questionnaire, this aspect could be studied through different empirical cognitive test settings.



## 5 Conclusions

This master's thesis has done an extensive literature review on the valued scientific papers on trust, particularly in supply chain context. Based on these findings a theoretical framework has introduced and finally tested through empirical analysis in the form of a questionnaire to logistics experts all around Finland.

The research questions of this thesis were:

1. What is trust, and what is its relationship with Supply Chain Management?
2. Can trust be seen as a capital?
3. How is trust accumulated in Supply chain collaboration?
4. Is the nature of trust in supply chain context more calculative or knowledge-based?
5. How can trust building be encouraged to increase the performance of the supply chains?

Based on the results of this thesis it can be concluded that trust is an important social factor (a social glue) in supply chains explaining the competitive advantages for collaborating companies in various ways. Trust is accumulated from reciprocity and common understanding of the parties. Trust is more easily lost than gained because the existence of *reciprocity norm* punishes those agents who are not willing to play by the common rules and acts opportunistically. Trust is the essential factor explaining successful supply chain management. It is needed to flourish new highly advanced and high-flying technical innovations as well as to guarantee the efficient flow of information, goods, and services. Trust helps to tackle the *bullwhip effect* because it decreases the behavioral uncertainty between the companies.

Trust is accumulated in a temporal context through reciprocity of the parties in a certain context, which is affected by cultural factors, institutions, law and contract enforcement and information asymmetry, and so forth. Forming trust is usually slow and iterative, and goes through different stages, based on the familiarity, affection, and history between the parties involved in trust associated acts. Trust can be viewed as a capital since it is clearly an asset for the companies working in the market environments. Companies carry their reputation and trust capital as a signal of their competence and goodwill. Information sharing, perceived efficiency, and seamlessness of the collaboration and the reputation of the partner companies in a supply chain companionship explains the existence of trust in the supply chain.

The *knowledge-based theory of trust* explains the phenomenon better in supply chain context than the *calculus-based theory*, meaning trust is not fundamentally about game

theoretical and calculative utility maximization but is deeply rooted in motives such as compassion, empathy, and goodwill. Trust is more holistic and multi-dimensional than the transaction economics explain. Assets specific investments and good contracting as explanatory factors of trust are exaggerated.

Trust building can be encouraged in supply chains in several manners, such as knowledge management and organizational policies, which promote the creation and exploitation of tacit knowledge. Affinity groups are a good way to ensure the flow of highly valuable tacit and inimitable sort of informal knowledge between and in the organizations. Extensive sharing of information with the partners create trust and allows to tackle the inefficient buffer inventories and remove *slack* (additional capacity) from the supply chain.

As supply chain management is greatly about human psychology and confidence, signaling trust and sharing information seems to be the greatest assets to enhance partnerships in supply chains. This thesis suggests that though trust is a complex phenomenon, it should not be neglected by the organizations. Instead, it should be studied more and managed with a high priority in the organizations. Collective learning, understanding, and affection-based trust through interpersonal relationships allow companies to evolve their partnerships and to develop new highly technical innovations and sustainable competitive advantages.

## 5.1 Theoretical contribution

This thesis has demonstrated that trust in the context of supply chain management is explained better by the knowledge-based theory, rather than the calculus-based view on trust. This means that supply chain management should be seen in a holistic way from the perspective of cognitive individuals, not from the narrow perspective of transaction economics (TCE). Interdisciplinary viewpoints should be taken into account at least from the field of evolutionary biology, microeconomics, cognitive science, game theory, and sociology, as they bring together a more holistic and realistic perspective to trust and collaboration in supply chain context.

Trust can be seen as a capital which is accumulated in a temporal context as people in supply chain collaboration learns about each other's values, sentiments, mindsets, preferences and way they interact and react to the world. This means that trust is an asset, and trust building is an iterative process, which develops by time. Trust is learned slowly but can be lost in a short

time if some parties are not acting reciprocally. Trust is the most important factor for explaining successful supply chain management.

Trust is related to the openness of information sharing and the creation of tacit knowledge. The creation and use of tacit knowledge are one of the most important ways for companies to build sustainable competitive advantages, especially in information-intensive industries. This high-flying, inimitable and unique type of knowledge cannot be reproduced easily and therefore it is highly valuable. An atmosphere of robust trust in organizations is required in order for the company employees to learn collectively and develop new ideas. The results of this study confirm indeed that *“Trust is at the heart of a collaborative innovation capability”* as Fawcett et al. (2012) argues.

## 5.2 Managerial implications

Knowledge management and processes, which ensure the creation of interpersonal trust and information flow in the organizations, should be established. In a supply chain consisting of several companies, the so-called affinity groups are a good method to ensure the circulation of information, knowledge, and ideas. In these groups, people in different organizations can share a free dialogue and build interpersonal relationships so that the parties will understand each other better from the basis of knowledge and identification-based trust, rather than the calculus-based trust.

Managers in companies should understand the deep tacit nature of knowledge and establish a corporate environment where this knowledge can be enhanced in a dialogue and exploited by the company to make more profit. Managers should understand that the flow of information and other intangible elements of supply chain collaboration create the competitive advantage rather than the tangible aspects. This requires a high amount of trust.

The results imply that the management of the companies should establish corporate and supply chain level programs to incentivize the creation of interpersonal relationships and to form a company culture, which favors interaction among different parties in the supply chain. Managers should take seriously trust building in strategic supply chain alliances in the future.

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## Appendix A: Questionnaire (in Finnish)

Figure A1: The questionnaire

### Supply Chain Collaboration -tutkimus

Tämä kysely on osa Aalto-yliopiston kauppakorkeakoulun tieto- ja palvelutalouden laitoksen ISM-maisteriohjelmassa (Information and Service Management) opiskelevan Mikko Laakson pro gradu -työtä, jossa tutkitaan eri tekijöiden vaikutusta toimitusketjujen tehokkuuteen.

Tutkimuksen aineiston kerääminen on toteutettu yhteistyössä Suomen Osto- ja Logistiikkayhdistys LOGY ry:n kanssa ja sen tulokset välitetään yhdistyksen jäsenille kattavana raporttina kyselyn päätyttyä. Vastaamalla kyselyyn osallistut arvokkaan tiedon tuottamiseen ja pääset samalla itse tutkimaan tuloksia niiden valmistuttua.

Vastaaminen tähän kyselyyn kestää noin 5-10 minuuttia. Kaikki vastaukset ovat täysin luottamuksellisia ja anonyymejä. Voit halutessasi osallistua kyselyn lopussa 4 x 2 elokuvalipun arvontaan. Arvonta suoritetaan eri lomakkeella kuin kysely, joten arvontaan antamiasi tietoja ja vastausta kyselyyn ei voida yhdistää.

\*Pakollinen

#### OSIO A: Väittämiä toimitusketjun hallinnasta yleisellä tasolla (8 väittämää, 1 monivalinta)

Ensimmäisessä osiossa pyydän, että vastaat seuraaviin väittämiin toimitusketjujen hallinnasta (Supply Chain Management) kokemuksiesi perusteella yleisellä tasolla.

**Väittämä 1: Hyvin määritellyt sopimukset ja kannustinjärjestelmät ovat tärkeämpiä kuin syvän luottamuksen rakentaminen toimitusketjuissa. \***

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 2: Luottamus ja ihmisten välisen kommunikoinnin saumattomuus on tärkeämpää kuin teknologian hyödyntäminen toimitusketjuissa. \***

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 3: Toimitusketjukumppanuudesta on ensisijaisen tärkeää saada hyötyjä nopeasti.** \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 4: Kustannushyötyihin johtava luottamus toimitusketjukumppanin kanssa syntyy yleensä enemmän hitaasti kuin nopeasti.** \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 5: Kerran menetettyä luottamusta toimitusketjukumppanin kanssa on hankala palauttaa.** \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 6: Toimitusketjun sisällä olevan hiljaisen tiedon kartuttaminen ja sen hyödyntäminen on yksi tärkeimmistä kilpailukykytekijöistämme.** \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 7: Teknologian roolia toimitusketjujen ylivoimaisuustekijänä usein liioitellaan.** \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Väittämä 8: Toimivien yhteistyömuotojen rakentaminen toimitusketjuissa on iteratiivinen ja aikaa vievä prosessi. (Trial and error.) \***

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

**Aseta seuraavat asiat tärkeysjärjestykseen sen kannalta, mitkä vaikuttavat myönteisimmin onnistuneeseen toimitusketjujen hallintaan. (1=tärkein / 8=vähiten tärkeä) \***

	1 tärkein	2	3	4	5	6	7	8 vähiten tärkeä
Uusinta teknologiaa hyödynnetään maksimaalisesti	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toimitusketjun kumppanit ovat luotettavia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toimitusketjun kumppanit ovat sitoutuneita yhteistyöhön	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sopimuskehikko ja -ehdot on määritetty hyvin kumppanien kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tiedonvaihto kumppaneiden kanssa on tehokasta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kumppaneilla on hyvä maine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toiminta kumppaneiden kanssa on ennustettavaa ja vähäriskistä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kumppanit ovat tehokkaita ja joustavia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## OSIO B: Väittämiä tietystä toimitusketjukumppanistasi (16 väittämää)

Tässä osiossa pyydän, että palautat mieleesi yhden keskeisimmistä toimitusketjukumppaneistasi urallasi (supply chain partner). Tarkasteltava kumppanuus voi olla nykyinen tai jo päättynyt. Kumppanuus saattoi päättyä myönteisesti tai kielteisesti edustamasi organisaation kannalta. Niin myönteisistä kuin myös kielteisistä kumppanuuksista on apua tutkimuksen kannalta!

Tärkeintä on, että vastaat kaikkiin osion B kohtiin pitäen mielessäsi SAMAN TOIMITUSKETJUKUMPPANIN. (Mikäli toimit / olet toiminut toimitusketjussa ulkopuolisena konsulttina, vastaa tähän osioon kuvailemalla asiakkaasi ja tämän asiakkaan välistä toimitusketjukumppanuutta.)

Onko mieleen palauttamasi kumppanuus nykyinen vai osaltasi jo päättynyt? \*

- ☐ Nykyinen
- ☐ Päättynyt

Yhteistö toimitusketjukumppanin kanssa toimii (tai toimi) tässä/näillä alueilla:

- ☐ Suomi
- ☐ Muut Pohjoismaat
- ☐ Länsi- ja Keski-Eurooppa
- ☐ Itä-Eurooppa
- ☐ Etelä-Eurooppa
- ☐ Afrikka
- ☐ Lähi-Itä
- ☐ Venäjä
- ☐ Pohjois-Amerikka
- ☐ Keski- ja Etelä-Amerikka
- ☐ Australia ja Oseania
- ☐ Japani
- ☐ Kauko-itä (Kiina, Intia ym.)
- ☐ En halua vastata / En osaa sanoa



Mieleen palauttamassa kumppanuudessa yritykseni  
liikevaihtoluokka on/oli:

Valitse



Mieleen palauttamassa kumppanuudessa  
toimitusketjukumppanin liikevaihtoluokka on/oli:

Valitse



Mieleen palauttamani yrityksen toimialaluokka (TOL2008)  
on/oli:

Valitse



Mieleenpalauttamani yrityksen kumppaniyrityksen  
toimialaluokka (TOL2008) on/oli:

Valitse



Väittämä 1: Luottamus mieleen palauttamassani  
toimitusketjussamme toimii/toimi erinomaisesti. \*

1 2 3 4 5 6 7 8 9

Täysin eri  
mieltä

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Täysin samaa  
mieltä

Väittämä 2: Tiedon jakaminen mieleen palauttamassani  
toimitusketjussa on/oli syvää ja laajamittaista. \*

1 2 3 4 5 6 7

Täysin eri  
mieltä

☐ ☐ ☐ ☐ ☐ ☐ ☐

Täysin samaa  
mieltä

Väittämä 3: Mieleen palauttamani toimitusketjun yhteiset  
ohjausjärjestelmät hyödyntävät/hyödynsivät uusinta  
teknologiaa. \*

1 2 3 4 5 6 7

Hyvin vähän

☐ ☐ ☐ ☐ ☐ ☐ ☐

Todella paljon

Väittämä 4: Mieleen palauttamani kumppanuutemme on  
kestänyt (tai kesti) pitkään. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 5: Mieleen palauttamallani kumppanilla on/oli hyvä  
maine markkinoilla. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 6: Mieleen palauttamani toimitusketjumme  
kykenee/kykeni hyödyntämään sen sisällä olevaa hiljaista tietoa  
erittäin hyvin. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 7: Mieleen palauttamassani yhteistyössä  
toimitusketjumme sopimuskehikko on/oli selkeä ja laajasti  
määritelty mm. riskinhallintaa varten. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 8: Olemme investoineet erittäin paljon juuri tähän  
mieleen palauttamaani kumppanuuteen siten, ettei näitä  
investointeja voi hyödyntää välttämättä muiden kumppaneiden  
kanssa. (Asset specific investment) \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 9: Mieleen palauttamani kumppanimme on investoinut erittäin paljon meihin siten, ettei näitä investointeja voi hyödyntää välttämättä muiden kumppaneiden kuin meidän kanssa. (Asset specific investment) \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 10: Mieleen palauttamani kumppanuus toimii/toimi erittäin tehokkaasti ja saumattomasti. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 11: Toimitusketjukumppanuudesta on erittäin paljon hyötyä edustamalleni yritykselle. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 12: Toimitusketjukumppanuudesta on erittäin paljon hyötyä kumppanuuden vastapuolelle. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 13: Keskitymme toimitusketjukumppanin kanssa enemmän lyhyen aikavälin hyötyihin kuin pitkän aikavälin hyötyihin. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 14: Mieleen palauttamani toimitusketjumme yritystenvälisten prosessien integraatio on/oli erittäin syvää. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 15: Olemme valmiita joustamaan ja uhrautumaan tarvittaessa mieleen palauttamani toimitusketjukumppanimme puolesta. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Väittämä 16: Mieleen palauttamani toimitusketjukumppanimme on/oli valmis joustamaan ja uhrautumaan tarvittaessa puolestamme. \*

	1	2	3	4	5	6	7	
Täysin eri mieltä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Täysin samaa mieltä

Palautetta kyselyn tekijälle / jonkun vastauksen täsmennys (vapaaehtoinen)

Oma vastauksesi

**Paina vielä "lataa" -nappia alla!**

**LATAA**

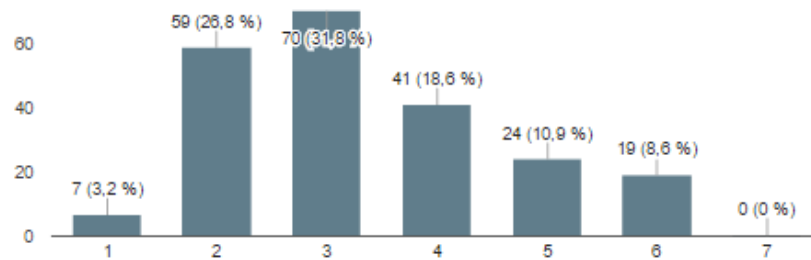
Älä koskaan lähetä salasanaa Google Formsin kautta.

## Appendix B: Data of the Questionnaire (in Finnish)

### OSIO A: Väittämiä toimitusketjun hallinnasta yleisellä tasolla (8 väittämää, 1 monivalinta)

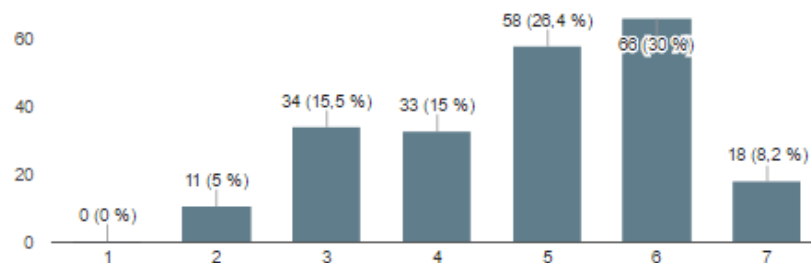
**Väittämä 1:** Hyvin määritellyt sopimukset ja kannustinjärjestelmät ovat tärkeämpiä kuin syvän luottamuksen rakentaminen toimitusketjuissa.

(220 vastausta)



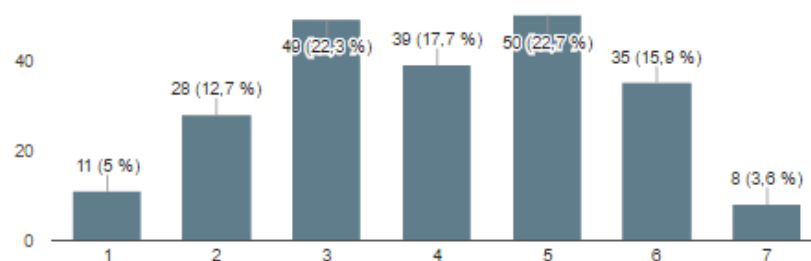
**Väittämä 2:** Luottamus ja ihmisten välisen kommunikoinnin saumattomuus on tärkeämpää kuin teknologian hyödyntäminen toimitusketjuissa.

(220 vastausta)



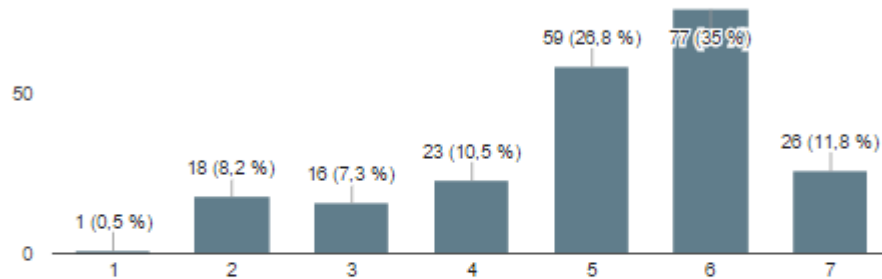
**Väittämä 3:** Toimitusketjukumppanuudesta on ensisijaisen tärkeää saada hyötyjä nopeasti.

(220 vastausta)



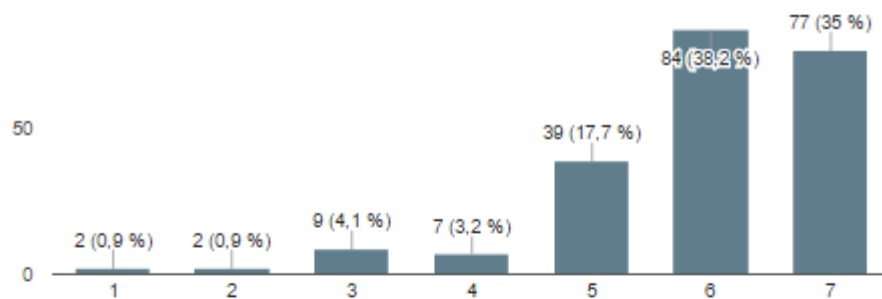
**Väittämä 4: Kustannushyötyihin johtava luottamus toimitusketjukumppanin kanssa syntyy yleensä enemmän hitaasti kuin nopeasti.**

(220 vastausta)



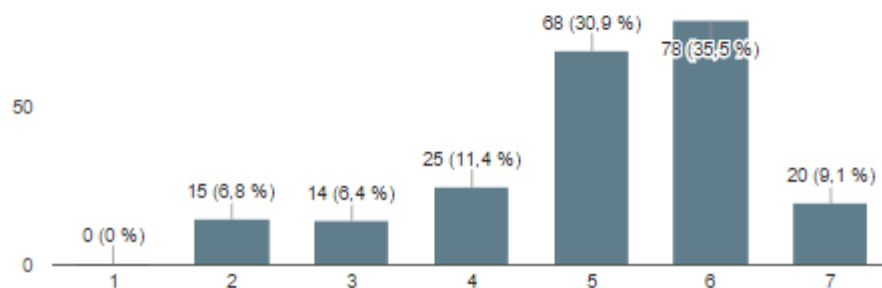
**Väittämä 5: Kerran menetettyä luottamusta toimitusketjukumppanin kanssa on hankala palauttaa.**

(220 vastausta)



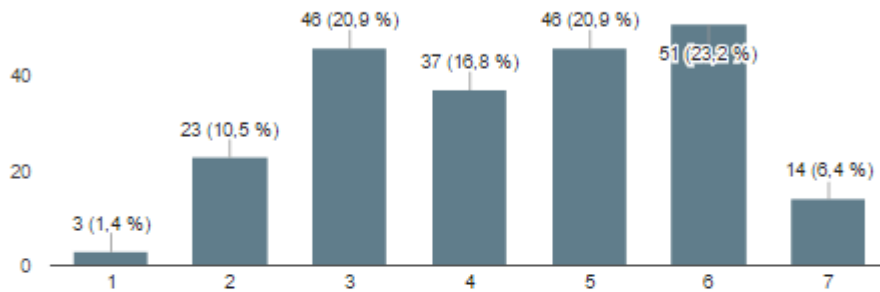
**Väittämä 6: Toimitusketjun sisällä olevan hiljaisen tiedon kartuttaminen ja sen hyödyntäminen on yksi tärkeimmistä kilpailukykytekijöistämme.**

(220 vastausta)



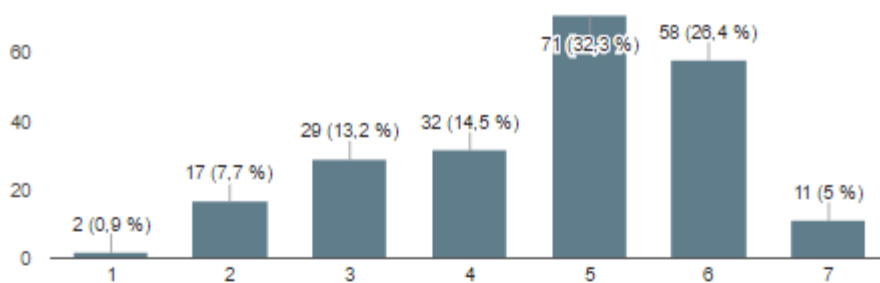
### Väittämä 7: Teknologian roolia toimitusketjujen ylivoimaisuustekijänä usein liioitellaan.

(220 vastausta)

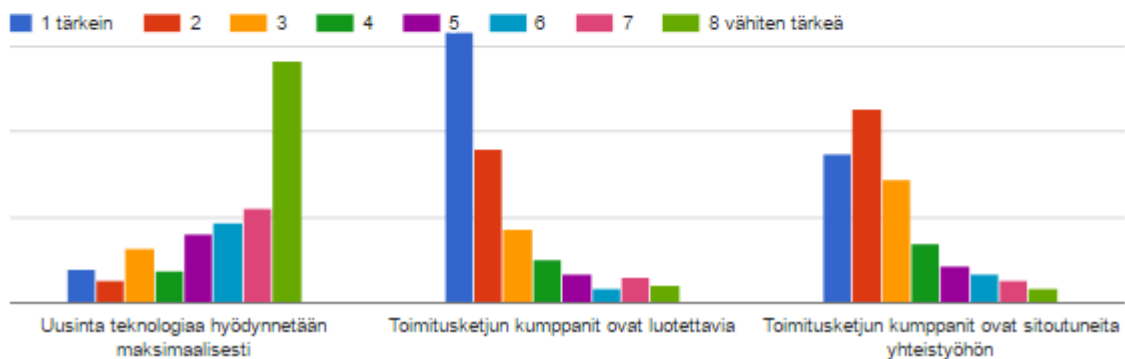


### Väittämä 8: Toimivien yhteistyömuotojen rakentaminen toimitusketjuissa on iteratiivinen ja aikaa vievä prosessi. (Trial and error.)

(220 vastausta)



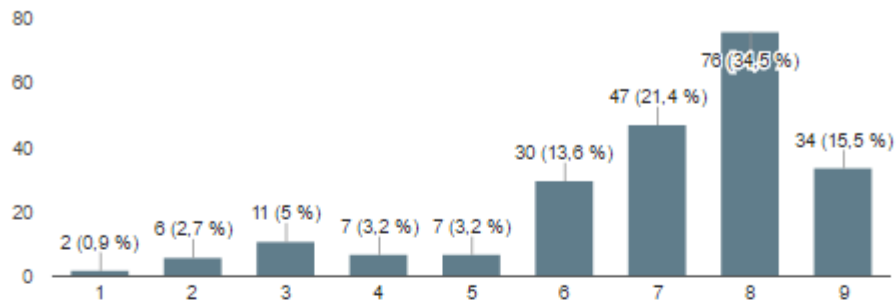
Aseta seuraavat asiat tärkeysjärjestykseen sen kannalta, mitkä vaikuttavat myönteisimmin onnistuneeseen toimitusketjujen hallintaan. (1=tärkein / 8=vähiten tärkeä)



## SECTION B

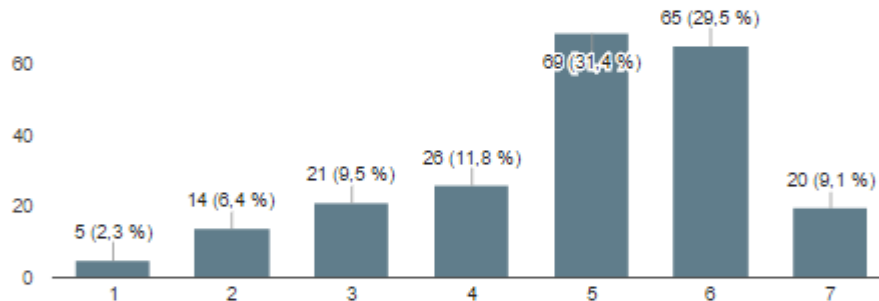
### Väittämä 1: Luottamus mieleen palauttamassani toimitusketjussamme toimii/toimi erinomaisesti.

(220 vastausta)



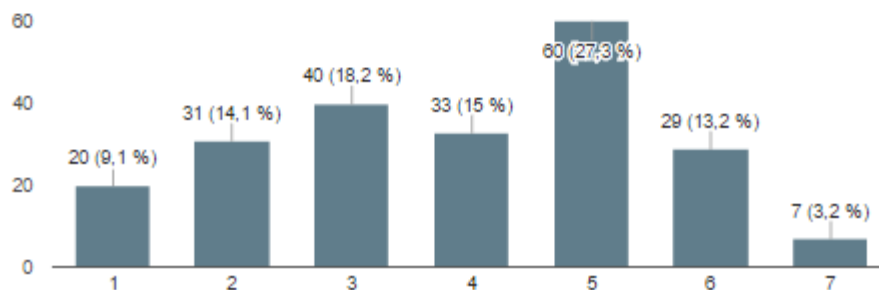
### Väittämä 2: Tiedon jakaminen mieleen palauttamassani toimitusketjussa on/oli syvää ja laajamittaista.

(220 vastausta)



### Väittämä 3: Mieleen palauttamani toimitusketjun yhteiset ohjausjärjestelmät hyödyntävät/hyödynsivät uusinta teknologiaa.

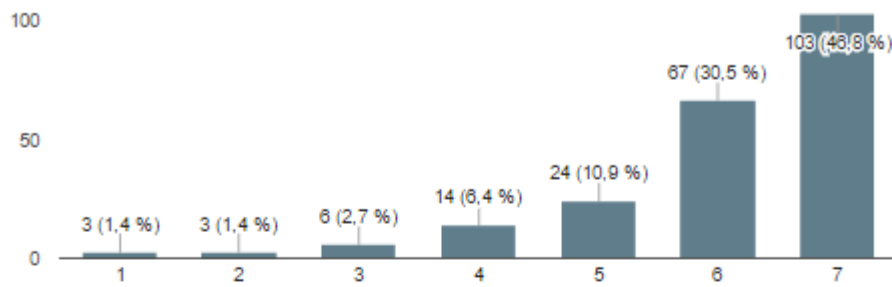
(220 vastausta)





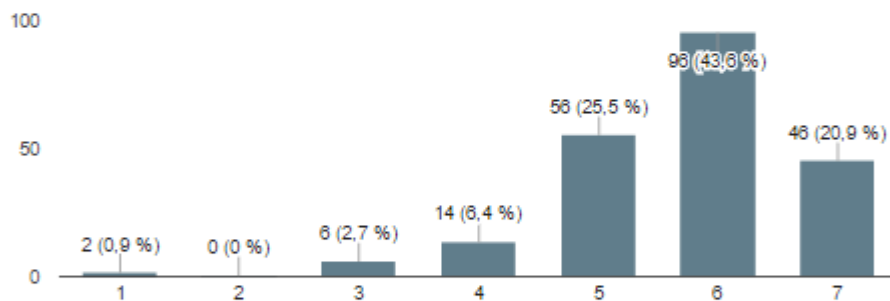
**Väittämä 4: Mieleen palauttamani kumppanuutemme on kestänyt (tai kesti) pitkään.**

(220 vastausta)



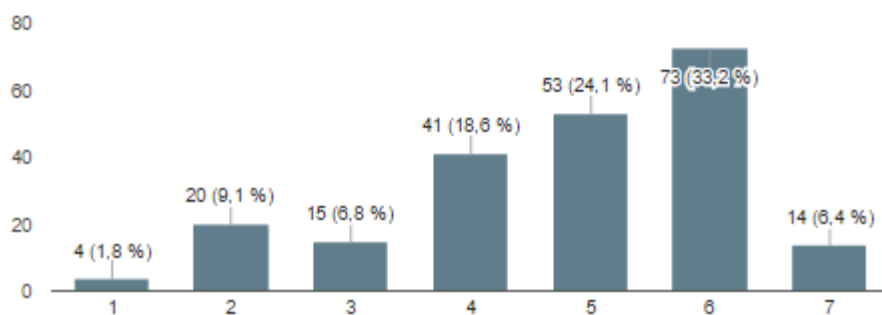
**Väittämä 5: Mieleen palauttamallani kumppanilla on/oli hyvä maine markkinoilla.**

(220 vastausta)



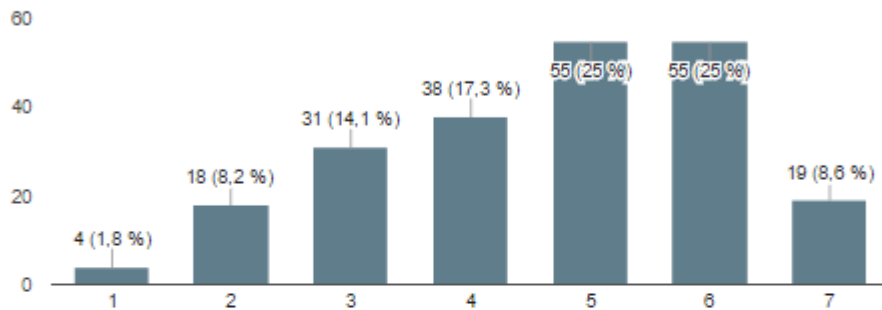
**Väittämä 6: Mieleen palauttamani toimitusketjumme kykenee/kykeni hyödyntämään sen sisällä olevaa hiljaista tietoa erittäin hyvin.**

(220 vastausta)



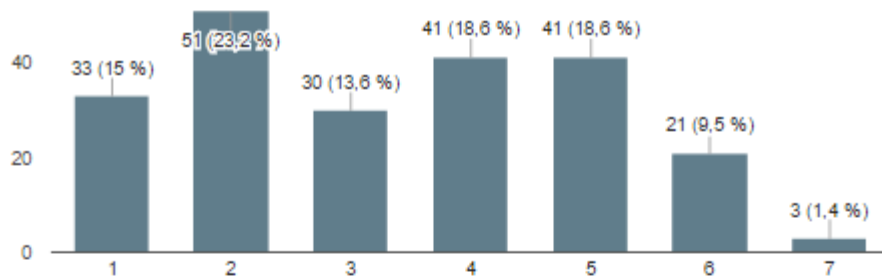
**Väittämä 7: Mieleen palauttamassani yhteistyössä toimitusketjumme sopimuskehikko on/oli selkeä ja laajasti määritelty mm. riskinhallintaa varten.**

(220 vastausta)



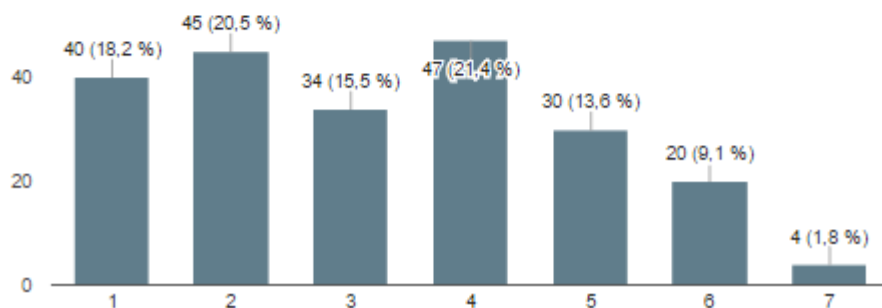
**Väittämä 8: Olemme investoineet erittäin paljon juuri tähän mieleen palauttamaani kumppanuuteen siten, ettei näitä investointeja voi hyödyntää välttämättä muiden kumppaneiden kanssa. (Asset specific investment)**

(220 vastausta)



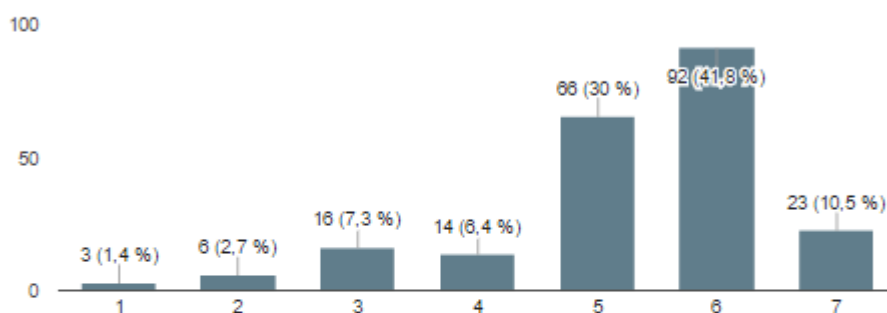
**Väittämä 9: Mieleen palauttamani kumppanimme on investoinut erittäin paljon meihin siten, ettei näitä investointeja voi hyödyntää välttämättä muiden kumppaneiden kuin meidän kanssa. (Asset specific investment)**

(220 vastausta)



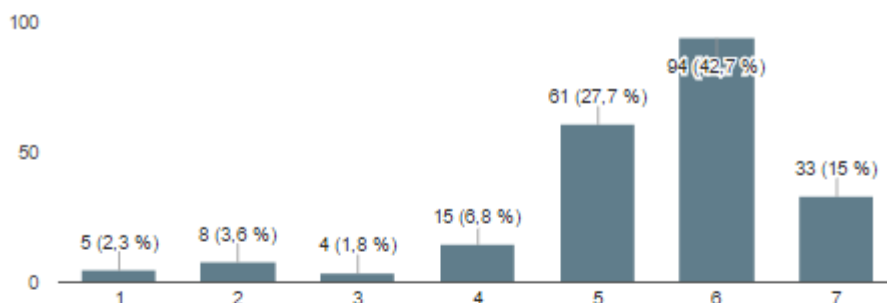
**Väittämä 10: Mieleen palauttamani kumppanuus toimii/toimi erittäin tehokkaasti ja saumattomasti.**

(220 vastausta)



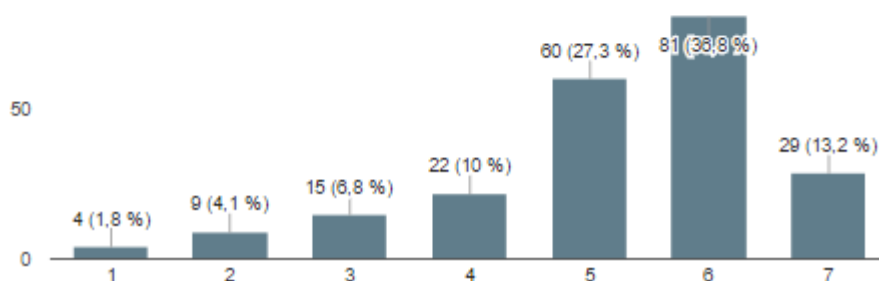
**Väittämä 11: Toimitusketjukumppanuudesta on erittäin paljon hyötyä edustamalleni yritykselle.**

(220 vastausta)



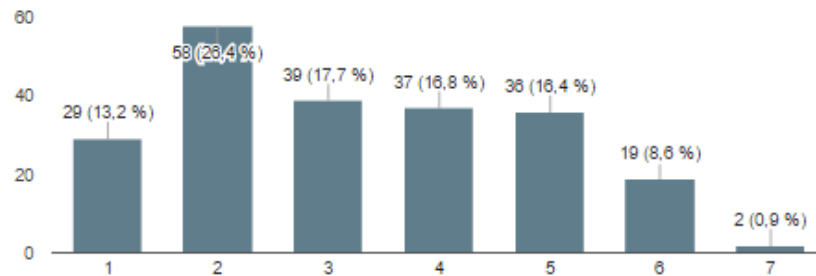
**Väittämä 12: Toimitusketjukumppanuudesta on erittäin paljon hyötyä kumppanuuden vastapuolelle.**

(220 vastausta)



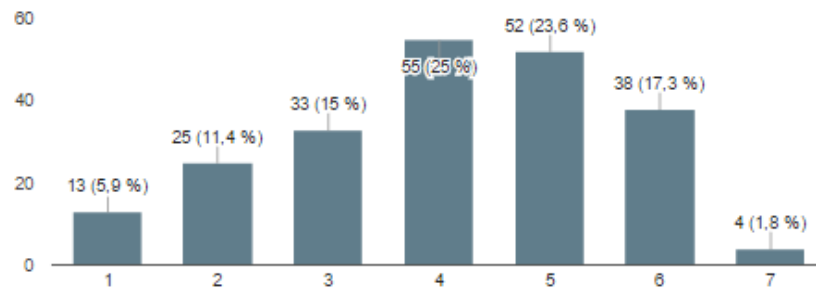
**Väittämä 13: Keskitymme toimitusketjukumppanin kanssa enemmän lyhyen aikavälin hyötyihin kuin pitkän aikavälin hyötyihin.**

(220 vastausta)



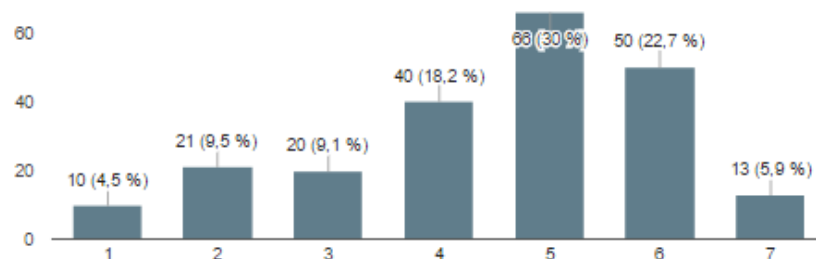
**Väittämä 14: Mieleen palauttamani toimitusketjumme yritystenvälisten prosessien integraatio on/oli erittäin syvää.**

(220 vastausta)



**Väittämä 15: Olemme valmiita joustamaan ja uhrautumaan tarvittaessa mieleen palauttamani toimitusketjukumppanimme puolesta.**

(220 vastausta)



**Väittämä 16: Mieleen palauttamani toimitusketjukumppanimme on/oli valmis joustamaan ja uhrautumaan tarvittaessa puolestamme.**

(220 vastausta)

